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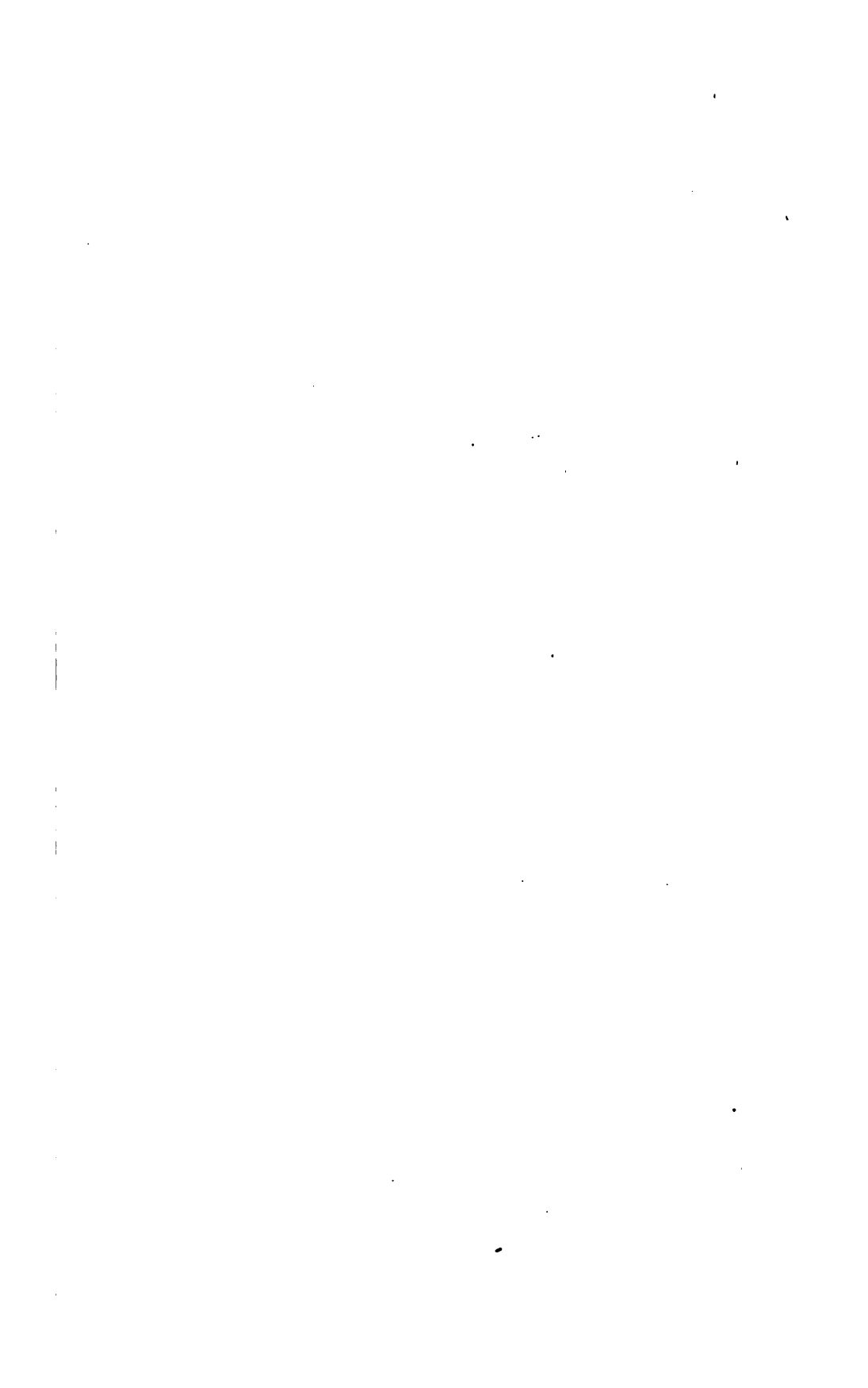
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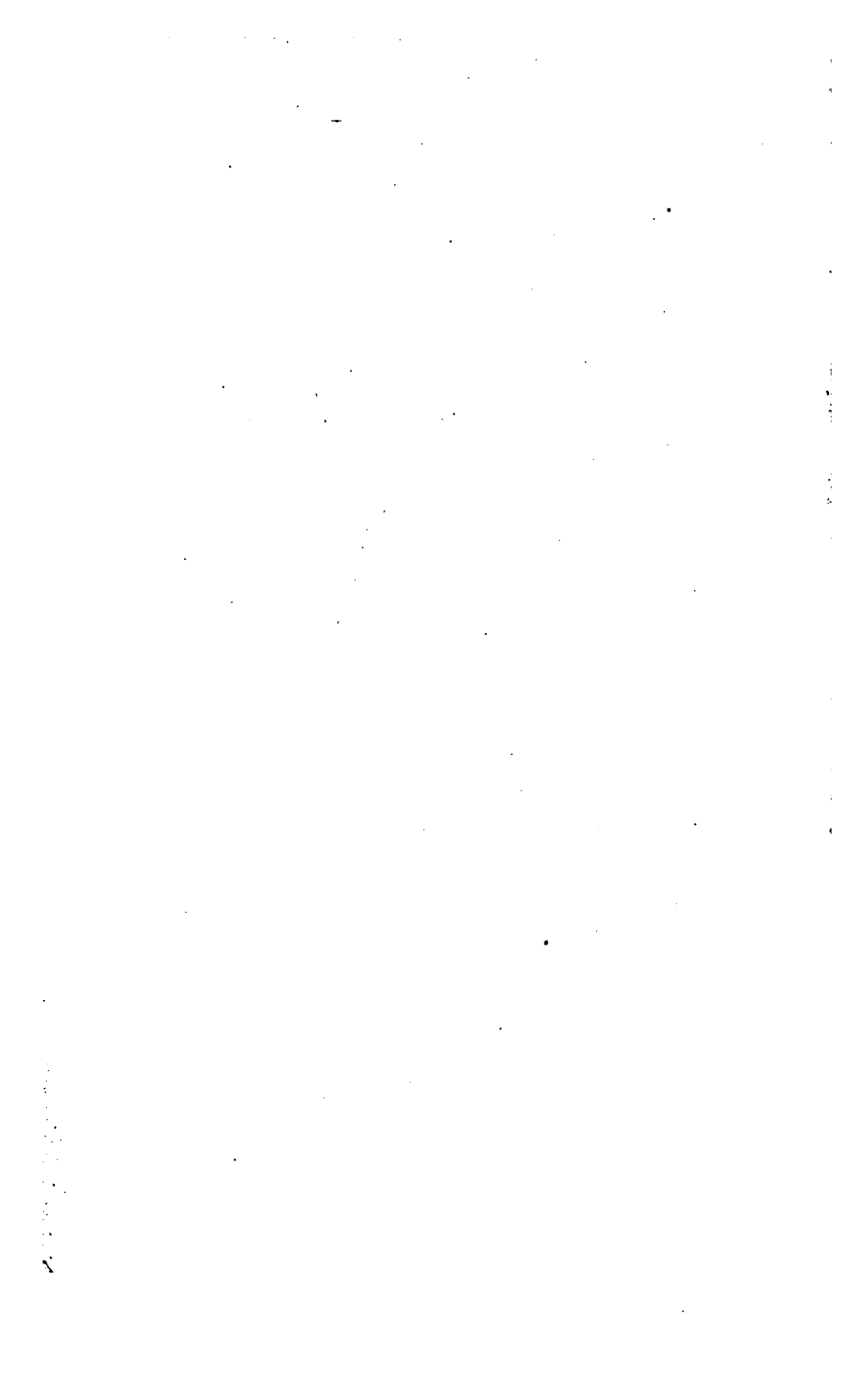






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*L. H. H. H.*



NAVY DEPARTMENT.  
U. S. — BUREAU OF MEDICINE AND SURGERY.

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# HYGIENIC AND MEDICAL REPORTS

BY  
MEDICAL OFFICERS OF THE U. S. NAVY.



PREPARED FOR PUBLICATION, UNDER THE DIRECTION OF THE SURGEON-  
GENERAL OF THE NAVY.

BY  
JOSEPH B. PARKER, A. M., M. D.,  
SURGEON, U. S. NAVY.  
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WASHINGTON:  
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1879.

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NAVY DEPARTMENT,  
BUREAU OF MEDICINE AND SURGERY,

July 1, 1879.

This volume is the continuation of similar publications heretofore issued by the Bureau of Medicine and Surgery.

As before announced, the aim of these works is to improve the sanitary condition of our ships of war and diffuse a knowledge of hygiene among the officers of the Navy.

The following figures are presented as evidence of the necessity for greater attention to matters relating to hygiene :

During the years 1876, '77, '78, it appears from the files of the Bureau that 29,154 cases of disease were treated in a yearly average force of about 10,000 (29,747 being the total force for the years mentioned), that 984 medical surveys were held (33 — per 1,000), and that 400 deaths were reported (13 + per 1,000); a loss to the service of nearly 46 per 1,000, as it can be supposed that only a small number of those surveyed returned to duty. By a more extended knowledge of naval hygiene it is hoped this large proportion can be reduced.

During the same period there were 1,273 applications from the Navy for pensions; 638 claims were allowed.—(Annual Report of the Commissioner of Pensions, 1878.)

The number of applications for pensions as stated above can be regarded as about the average for three years, but as many of the disabilities alleged may have occurred prior to 1876, the statement does not possess the value it would had this information been obtained.

The Bureau renews its invitation to medical officers to prepare and forward *with a view to publication* essays on subjects relating to the profession or its allied branches.

J. WINTHROP TAYLOR,  
*Surgeon-General United States Navy.*



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# **PART I.**

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## **HYGIENIC REPORTS**

**FROM**

**MEDICAL OFFICERS OF THE UNITED STATES NAVY.**

**1 HY**





**NORTH ATLANTIC STATION.**

**1875.**



## NORTH ATLANTIC STATION.

U. S. S. SWATABA.

### REPORT OF SURGEON EDWARD KERSHNER.

The whole complement, composing the crew of the United States steamer Swatara, consists of the commander, 14 ward-room officers, 8 steerage officers, 4 warrant officers, and 173 men.

The following is the cubic capacity of the different habitable portions of the ship, and the number of cubic feet of air-space to each individual:

The cabin has 4,550 cubic feet of air-space; occupied by one officer, the commander.

The wardroom, in which 12 officers live, has 7,256 cubic feet of air-space, averaging, to each officer, 604.8 cubic feet of air-space, *i. e.*, providing the doors to all the state-rooms are open, allowing throughout a free circulation; otherwise the after rooms (which are much smaller than the forward) get less than 400 cubic feet.

The steerage, inhabited by 8 officers, has 1,669.5 cubic feet of air-space, allowing 208.5 cubic feet for each man.

The warrant-officers' rooms are as large as the forward rooms in the wardroom. They average 600 cubic feet of air-space to each person.

The berth-deck has a cubic capacity of 23,700 feet; deducting from this 10,160 cubic feet, taken up by mess-chests, clothes-bags, coal-bunkers, etc., leaves a cubic air-space of 13,600 feet; 104 men sleep on this deck at night, allowing for each man but 130.7 cubic feet air-space. Beneath the forecastle there is an air-space of 6,152 cubic feet. Sixty-nine men swing there at

night, giving an average of less than 100 cubic feet to each man. The sick-bay has 1,100 cubic feet of air-space.

The percentage of sickness and mortality is: sickness, 1.77; mortality, .5.

As regards the ventilation of the ship, in many instances it is deplorably bad. The cabin is ventilated by means of 2 doors, 6 large gun-ports, and a large hatch opening through the poop-deck. There is ample opportunity at all times for fresh air without the occurrence of draughts.

The wardroom is ventilated by means of a large hatch opening through the quarter-deck, a large hatch leading from beneath the break of the poop to about the centre of the wardroom, and a small hatch leading from the poop-deck to the pantry at the extreme after part of the wardroom. The body of the wardroom (the country) is sufficiently well ventilated, and the air-space pure and healthful, providing the doors into state-rooms are closed. The rooms themselves, in which the officers are supposed to live and sleep, could not possibly have air in a more vitiated state than it is. The gaseous emanations from the bilge are conducted directly into the rooms by means of large apertures opening over the "knees" in the timbers. These apertures have a diameter of 4 inches, and an average length of about 3 feet, and there are two in each room: at times the air is unbearable and the rooms uninhabitable; a sheet of bibulous paper, saturated with a solution of acetate of lead, and placed over one of these apertures, or even in the room, becomes blackened from the quantity of sulphuretted hydrogen in the air. The effect of sleeping in such an atmosphere is as follows: You awake in the morning feeling dull and unrefreshed, with a frontal headache, a dry, parched throat, and an excessive thirst, with a bad taste in the mouth, and a poor appetite. The effect of sleeping in such an atmosphere for many nights consecutively would undoubtedly be to seriously impair the health. Weather

permitting the officers usually sleep in the open air upon the poop. During the last two months nearly every officer has suffered more or less from exposure to these poisonous gases in the hot weather of the tropics; and, in some cases, officers are almost unfit for duty from the debility and loss of health attending this exposure.

The remedy for such a state of things is quite apparent. To prevent the odor of the bilge being detected on the berth-deck would necessitate a change in the construction of the ship. It will probably at some day become apparent that a ship should be ventilated by tubes leading to the spar-deck, and not below on the berth-deck, where there is no opportunity for the odors to escape. Stopping the apertures, although it mitigates, does not altogether alleviate the evil. More or less of the gases find their way through cracks. The bilge itself is almost a necessary accompaniment to a ship; a "sweet bilge," if ever found, is almost an anomaly. Numerous organic substances find their way from time to time into the bilge. These decompose, and the gaseous emanations find their exit at the most convenient places. Much can be done to prevent substances getting between the flooring and the bottom of the ship, such as oil from the machinery, various substances from the paymasters' storerooms, etc. When once there, it is almost impossible to thoroughly cleanse it, as the greater portion of the decaying animal and vegetable matter will be found inaccessible. Disinfectants to destroy the odor are often as bad as the odor itself, and also ineffectual as remedial agents. This whole subject has been discussed in a former report to the Surgeon-General. At that time it was supposed that, as the ship was undergoing repairs, these defects would receive proper attention, inasmuch as the efficiency of the ship depends largely on the vigor and health of her officers and crew; but, much to my surprise, the ship was ordered to sea with only a few copper strips nailed loosely over some of the

apertures on the berth-deck, and now this great evil remains in the same state as when the ship was first laid up for repairs. The best-directed and most persevering efforts of the officers of the ship have thus far proved futile, and the offending matter can neither be reached nor removed. To attempt to impress upon the bureau the extreme danger of this state of affairs in a tropical climate would be a reflection upon its intelligence. Every hygienic law having been disregarded thus far in the construction of our ships, I would suggest the propriety of having a medical officer to inspect ships *under construction*, and report deficiencies in this respect before it is too late to change or remedy defects.

The steerage, on account of its small dimensions, the number of its occupants, and the poor means of ventilation, is, at times, scarcely habitable. The ventilation is by means of a single hatch opening into the centre from the quarter-deck. The projecting wings of the steerage are arranged in the best possible manner to prevent the circulation of air. A bulkhead extends entirely across the steerage, a few feet forward of the wardroom bulkhead, excluding all air except through the hatch and door, while the hatch of the main after-hold, opening into the steerage, tends to further vitiate the air. The bilge smell is but little troublesome. At night the air is heavy and unfit for respiration.

In the engineers' department the temperature is exceedingly high when under steam, being often up to 150°. The work here is the most exhausting and trying, and, taking into consideration the heat and closeness of the air, loaded with dust of coal, flying ashes, cinders, and sulphurous gases, it is surprising that human life can be supported in such an air. I have the good fortune to say that, although a large part of the engineer force has been on the list, yet we have had no very serious cases of exhaustion, and I think that this good luck may be attrib-

uted to the care taken to have the men change into dry clothes, keeping them out of draughts of cool air, and the use of a small quantity of spirits after the warmest and most exhausting watches. In this connection, I beg to say that the compound engines are, in my opinion, unfit for cruises in warm climates, as it is almost impossible to find men able to endure the intense heat of the engine-room.

The shaft-alley is totally devoid of any ventilation. At the end, there are two apertures, each 3 inches in diameter, for the purpose of allowing the heated air to escape. The object is not accomplished, as the flame of a candle held at the mouth of the aperture is not deflected. The air is hot, close, and stifling in the alley. A hatch should be cut through from the upper deck.

The berth-deck is ventilated by means of three hatches forward and two aft (not including the engine and fire room hatches). The air in the daytime is none of the purest; the circulation is very sluggish; there is always a heavy, greasy odor pervading the place. This could be remedied by suspending fan-like arrangements in different parts of the ceiling, so as to induce currents and occasion a fresh supply of air to the various portions of the deck. At night, 104 persons are supposed to sleep on this deck, with an allowance of but little over 100 cubic feet of air to each man, at times some of the hatches being closed. Add to this the odor of the bilge, which is very freely ventilated into this deck, and you have an atmosphere which it is almost incredible to think any one could breathe for any length of time without serious impairment to health. To pass along this deck at night, after being in the fresh air, causes a sense of oppression amounting almost to nausea. The means for making a chemical examination of the atmosphere were not available, but, judging by the senses, the amount of carbonic acid, sulphuretted hydrogen, and nitrogenous products is entirely beyond anything that is allowable for

healthful respiration. The remedies are apparent. The bilge could be corrected by ventilating it into the open air, on the spar-deck; fewer men should sleep in such a small space; a great change could be made by keeping the deck scrupulously clean, this being a matter of greater importance (in a hygienic point of view) than the cleanliness of the quarter-deck.

The sick-bay has too little air-space; there is not sufficient for one man (*i. e.*, as allowed by the books).

In other respects the general arrangement of the ship, as regards ventilation, is very good; but I would suggest that instead of the old-fashioned air-ports the style of port in use on modern English ships should be adopted; that is, a port about 2 feet long by 1½ feet wide, thus giving free circulation of air as well as light.

The cabin and wardroom are well lighted. The steerage has but two air-ports on each side, and a hatch. During the brightest days it is dark and gloomy. The berth-deck is poorly lighted. Of all places in the ship the forepeak is the worst in point of light. Artificial light has to be employed at all times, and the men who work there show plainly the lack of the vivifying influence of sunlight; they are, as a rule, pale, weakly, and anæmic.

The ship is well warmed throughout by means of coils of pipe, through which steam is introduced. These pipes are very judiciously arranged, and, in cold weather, an equable temperature is maintained.

Water is stored in two large iron tanks, with a total capacity of 7,000 gallons, and in two hogsheads containing 400 gallons each. The first water was obtained at New York. Ever since it has been distilled from sea-water. With the exception of one day, when the condenser was out of order and allowed a good deal of salt water to distil over, the water has been very good and palatable, at times tasting insipid from lack of aeration.



The food of the crew is of good quality, and always sufficient in quantity. Each man is allowed on an average 1 pound of meat a day, 14 ounces of bread, 1 pint of coffee, 4 ounces of sugar, besides vegetables; at sea their diet consists chiefly of salt meats, beans, pickles, &c., but always of good quality, to preserve health.

In reference to clothing, the men are well furnished. In cold climates they have each two full flannel suits, and two white suits for warmer climates. If allowed to change whenever one suit gets wet, there is no danger of ill consequences resulting; otherwise, as flannel retains moisture a long time, if not changed, rheumatism, pneumonia, etc., may result. Furthermore, changes from blue to white should be made judiciously.

I would strenuously urge the abolition of white outside clothes in the service, as blue flannel is found to be much more healthy than white, and is, also, cooler; and as a sailor has no means of washing his white clothes, they generally have a dirty and filthy appearance.

I cannot too strongly urge the necessity of having one or more bath-rooms for the officers of the ship. At present there are none in the ship, except two in the cabin for the commanding officer. They should be provided for wardroom and steering officers, especially on ships destined to cruise in the tropics. There should also be wash and bath rooms at some proper locality in the ship for the men, and they should be furnished with a few towels each for purposes of cleanliness.

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#### U. S. FLAG-SHIP WORCESTER.

##### REPORT OF MEDICAL INSPECTOR SAMUEL F. COUES.

The vessels comprising the North Atlantic fleet, thirteen in number, except the iron-clad Dictator, the store-ship Pawnee, and tug Pinta, permanently stationed at Port Royal, and the

iron-clad *Canonicus*, at New Orleans, have cruised within the usual limits of the station.

The *Colorado*, *Canandaigua*, and *Kansas* have been put out of commission, and the iron-clad *Catskill* added to the fleet.

The aggregated sick-reports for the second, third, and fourth quarters show a remarkable immunity from disease, and small fatality, as may be seen in the following tabular statement.

Of the aggregate report for the first quarter, forwarded by my predecessor, no copy was transmitted to me.

Period.	Number of men.	Numbersick days.	Deaths.	Daily average.
Second quarter.....	1, 589	3, 599	*2	39 $\frac{1}{2}$
Third quarter.....	1, 407	3, 162	0	34 $\frac{1}{2}$
Fourth quarter.....	1, 805	3, 380	0	36 $\frac{1}{2}$

\* Both from accident.

*Prevailing diseases.*

Period.	Malarial fevers.	Digestive disorders.
Second quarter .....	30	60
Third quarter.....	40	70
Fourth quarter.....	53	30

No contagious or epidemic diseases reported.

To the admirable sanitary regulations suggested by a board of medical officers convened for the purpose, adopted and rigidly enforced by Rear-Admiral J. R. M. Mullany, commanding the fleet, may be attributed the excellent result attained.

On board the flag-ship *Worcester*, during a period of forty days, off *Aspinwall*, though the season was most unfavorable, but twenty cases of malarial fever occurred, and these, without exception, in subjects previously exposed to miasmatic poisoning. Every precaution was adopted to preserve the health of the crew; the bilges and all parts of the ship were scru-

pulously clean. The decks were kept as dry as practicable, and the ship's company was subjected to no exposure not absolutely necessary. Communication with the shore was somewhat restricted—no permission to be absent from the ship after sunset being granted.

Though the vessels of the fleet have been free from contagious, infectious, and epidemic disease, yellow fever has prevailed extensively at the Barrancas, near Pensacola, and at Key West. There have been many cases, also, at New Orleans, as may be seen by reference to the letters of Acting Assistant Surgeon Dillman, of the United States ship *Canonicus*, which are appended. At Key West the first case of the disease was reported on the 18th March. Between that date and the 9th of August, when the last death occurred, there had been from fifty to sixty cases and from twenty-five to thirty deaths. The greatest number of cases occurred in June and July.

Acting Assistant Surgeon R. J. Perry remarks that it is impossible to arrive at any positive estimate of the actual number of cases of, or deaths from, yellow fever during the year; he does not consider the reports of all the physicians trustworthy. I have the best reason to believe that the ravages of the disease have been underestimated. Dr. Perry regards the origin of the disease as purely local.

Port Royal Sound having been made the rendezvous for the fleet, several vessels have been permanently located there, and it has been visited by nearly all. The advantages of the position of these waters, for the purpose designated, are very obvious. The winter is mild and the heat of the summer months is tempered by almost uninterrupted sea-breezes. Facilities for living are excellent, and there is daily communication, by rail, with Savannah, Charleston, and Augusta.

The question of a supply of water for the fleet became one of great importance, especially during the summer months, when

the annoyance and bad effect of the extreme heat, occasioned by the fires necessary for the purpose of condensing water, became very apparent. Several ineffectual attempts to obtain good water were made, and, after leaving Port Royal, I requested Surgeon J. C. Spear to devote special attention to the subject; to make thorough examinations of all water that could be supplied in sufficient quantity from the vicinity. The letter of Dr. Spear, which is appended, shows that the desired result has been attained; that an adequate supply of excellent water exists in the immediate vicinity of Port Royal. At my request, Dr. Spear has also prepared tables of temperature and relative humidity, which are of great value, as are the statements in his able sanitary report. All of which papers are appended.

It will be seen that the region is peculiarly healthy; that, in a sanitary point of view, it compares most favorably with any other portion of the coast.

I would suggest the importance of providing suitable accommodations for the sick of the fleet, at Port Royal. Great expense in transportation would thus be saved.

An important and interesting surgical operation was performed on board the United States ship Worcester, by Assistant Surgeon D. N. Bertollette. Insufficient light, the high temperature at the time (84°), and all the inconveniences attending a midnight operation on shipboard, were peculiarly unfavorable circumstances. The operation, however, was perfectly well done, and the result was most satisfactory.

Dr. Bertollette's report of the case is appended. (Part II.)

## U. S. S. DICTATOR.

## REPORT OF SURGEON JOHN C. SPEAR.

The complement of men and officers is 164. The *air-space* for each man, in quarters below, is 39 cubic feet, and for each officer, including the commander, is 890 cubic feet. About half the crew, in port, in mild weather, berth on deck in a tent-like enclosure, which practically doubles the air-space to each man. The berth-deck, containing 5,670 cubic feet of air-space, is ventilated from above by hatch and ventilator area of 36 square feet, and the officers' quarters, with an air-space of 8,900 cubic feet, are ventilated in the same manner by an area of 38 square feet. The *lighting* of all parts of the ship is satisfactory, and the *warming*, by steam-heaters, in a mild climate like this one, is all that is required. Both condensed and spring water have been used. The *sick-rate* for the year, aboard, has been  $1\frac{1}{2}$  per cent. No deaths have occurred.

The average daily population in Port Royal waters since April 14, has been 499, which would give an average yearly naval population of 356 souls. There were two deaths in the entire force, one on board the Colorado from an injury, and the other on the Pawnee from drowning. This makes the *annual death-rate* of the Navy in Port Royal waters 5.6 per 1,000 men. In an average yearly population of 356 persons not a single death has occurred from any disease.

In July the water-contractor, Mr. D. H. Small, discovered near Beaufort, S. C., a source of water-supply for vessels-of-war rendezvousing here. It is a spring on Albert Gotha Creek, a tributary of Beaufort River, five miles above the town of Beaufort. The water flows from a wooded hillside composed of clean white sand. It is very clear and cool, is agreeable to the taste, and contains very little organic matter. The Dictator, Pawnee,

and Pinta have used it two months, and all agree that it is wholesome, keeps well in tank, and is in every respect much better than the water we formerly had from Charleston.

The contractor, since leasing the spring, has built a small sediment-tank of brick and Roman cement, and a large receiving-tank with a capacity of 9,130 gallons. He has also put up iron pipe, for a distance of 150 feet, to connect the receiving-tank with the water-boat in the creek below. The spring has now a capacity of 19,000 gallons daily, and in the rainy season it will probably be more.

At high tide a vessel drawing 7 feet can reach the spring and load in time to get out on the next high tide.

The ship's company has enjoyed remarkable freedom from malarial fevers during the summer and autumn months of this quarter. Of the five cases of *intermittent* fever reported only one is due to local causes, the other four being recurrent attacks. The two cases of *remittent* reported were contracted here, but in both there was special exposure on shore while in a state of intoxication.

Owing to insufficient berthing space below, half of the crew of the Dictator is obliged, in warm weather, to sleep on deck under the awning, and her people are, in consequence, specially exposed to any malaria there may be in the night air. It, therefore, seems that the remarkable healthfulness of her crew, under the circumstances, affords good evidence of the comparative freedom of this locality from malaria. The Dictator, during the time referred to, was anchored in Beaufort River, opposite Mr. English's plantation, half a mile from low, marshy shores on either side. No large body of fresh water empties into the rivers here, so that the river-water is nearly as salt as that of the sea. The sea-breeze in July, August, and September begins by 10 a. m. and continues till midnight, blowing generally quite fresh. The mean relative humidity for the quarter has been found to be 76,

day and night, which, considering the proximity of the sea and the extent of swamp-lands, shows that the *climate of Port Royal is relatively a dry one*. It is possible the above natural causes furnish an explanation as to the healthfulness of the waters of Port Royal.

When the fleet arrived here in April no sufficient supply of wholesome spring-water could be obtained, and a water-boat was engaged to bring water from Charleston. Later, however, water from the spring found near Beaufort has been in use on board. This water has been found pure and wholesome, and much better than that obtained from Charleston.

*Temperature and relative humidity, Port Royal Sound, S. C., on board United States ship Dictator.*

JULY, 1875.

Date.	Barometer.	Temp.		Relative humidity.				Date.	Barometer.	Temp.		Relative humidity.			
		12 m.	12 p. m.	8 a. m.	12 m.	8 p. m.	Daily mean.			12 m.	12 p. m.	8 a. m.	12 m.	8 p. m.	12 p. m.
5	88	85	70	55	75	72	68	19	101	84	47	45	72	91	64
6	86	82	74	72	75	74	74	20	95	86	87	59	72	75	73
7	85	85	70	67	72	72	70	21	87	85	75	75	69	75	72½
8	86	83	75	60	69	70	71	22	94	84	72	64	72	87	74
9	86	85	70	61	72	72	69	23	93	85	66	69	72	75	68
10	87	85	67	66	65	75	76	24	90	84	69	69	69	75	70½
11	92	86	72	54	72	75	68	25	90	84	69	66	69	75	70
12	87	85	78	66	95	75	78½	26	90	83	61	65	79	87	72½
13	94	83	91	54	74	74	73	27	88	84	64	65	75	75	69
14	94	83	70	49	72	74	66	28	90	86	75	37	72	72	61
15	95	85	72	59	72	75	69½	29	89	85	72	69	72	75	72
16	88	84	75	75	72	83	76	30	94	86	75	64	64	75	69½
17	93	87	60	57	75	84	71	31	96	82	75	59	69	74	69
18	99	87	69	59	80	84	73								

Monthly mean relative humidity, 70.

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*Temperature and relative humidity, Port Royal Sound, S. C., &c.—Continued.*

AUGUST, 1875.

Date.	Barometer.	Temp.		Relative humidity.				Date.	Barometer.	Temp.		Relative humidity.			
		12 m.	12 p. m.	8 a. m.	12 m.	8 p. m.	12 p. m.			12 m.	12 p. m.	8 a. m.	12 m.	8 p. m.	12 p. m.
1	92	83	66	60	70	74	67½	17	86	83	78	75	74	74	75
2	92	83	67	61	72	70	74	18	87	82	74	66	74	74	72
3	92	80	66	62	72	70	74	19	84	82	74	66	74	74	81
4	86	81	74	61	78	78	73	20	82	82	70	64	70	78	68
5	86	82	74	69	78	78	74	21	85	82	70	64	70	74	70½
6	86	82	78	69	83	83	78	22	86	78	90	64	74	74	82½
7	84	82	78	70	83	83	78½	23	84	80	82	70	74	74	82½
8	80	81	82	78	74	74	77	24	84	78	82	75	74	74	82½
9	83	81	70	79	78	74	75	25	82	76	81	78	74	74	85
10	84	81	75	79	78	78	77½	26	80	77	85	72	74	74	82
11	83	75	83	83	95	95	90	27	80	78	85	72	74	74	86
12	84	76	83	83	90	95	88	28	80	78	82	72	74	74	86
13	84	83	79	79	78	78	79½	29	80	80	90	68	74	74	85
14	92	82	75	63	79	83	75	30	82	82	90	55	79	78	78
15	92	81	75	70	83	87	79	31	87	82	82	73	87	83	79½
16	84	81	83	83	83	82	83								

Monthly mean relative humidity, 79.

SEPTEMBER, 1875.

Date.	Barometer.	Temp.		Relative humidity.				Date.	Barometer.	Temp.		Relative humidity.			
		12 m.	12 p. m.	8 a. m.	12 m.	8 p. m.	12 p. m.			12 m.	12 p. m.	8 a. m.	12 m.	8 p. m.	12 p. m.
1	92	80	63	60	83	83	77	16	90	75	91	69	95	85½	85½
2	92	80	63	55	74	83	71½	17	88	78	90	75	90	84½	84½
3	92	86	69	69	75	83	78	18	84	82	90	75	91	83	85
4	90	86	75	60	83	87	76	19	80	75	86	66	74	72	79½
5	93	72	60	57	87	95	78½	20	76	72	72	65	72	72	73½
6	90	83	69	79	79	79	77½	21	77	70	66	56	63	60	74
7	92	83	47	83	83	83	74	22	72	68	68	52	59	68	62
8	88	83	69	75	86	86	76	23	73	68	68	52	75	84	71½
9	90	82	49	83	74	68	74	24	72	66	78	71	84	78	78
10	87	83	66	75	79	74	74	25	76	72	84	65	85	90	81
11	88	91	72	90	90	86	86	26	68	67	90	94	90	90	91
12	83	84	76	81	83	83	80	27	65	68	83	90	94	94	90
13	82	86	78	74	74	80	80	28	76	74	80	86	90	95	90
14	82	80	74	74	74	77	77	29	78	70	81	92	90	90	83
15	84	86	70	61	82	82	74	30	78	76	90	69	90	90	85

Monthly mean relative humidity, 79.



# NORTH ATLANTIC STATION.

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Temperature and relative humidity, Port Royal Sound, S. C., &c.—Continued.

OCTOBER, 1875.

Date.	Barometer.	Temp.		Relative humidity.				Date.	Barometer.	Temp.		Relative humidity.			
		12 m.	12 p. m.	8 a. m.	12 m.	8 p. m.	12 p. m.			12 m.	12 p. m.	8 a. m.	12 m.	8 p. m.	12 p. m.
1	30.04	80	68	90	70	63	79	17	30.30	60	55	73	61	87	87
2	30.20	66	66	78	73	84	90	18	30.16	66	57	73	70	83	77
3	30.52	75	73	88	85	90	90	19	30.24	62	54	86	66	87	78
4	30.36	77	73	95	82	90	90	20	30.40	60	53	86	70	86	93
5	30.80	73	73	95	85	81	85	21	30.32	68	59	100	41	66	81
6	30.12	73	72	90	90	90	90	22	30.08	64	63	81	88	73	94
7	30.12	73	70	90	90	85	84	23	30.08	75	67	84	72	94	90
8	30.20	71	65	73	63	75	73	24	30.08	70	65	84	75	79	83
9	30.16	72	66	68	52	79	84	25	30.14	74	67	78	59	79	79
10	30.10	71	68	88	67	84	75	26	30.20	76	67	90	76	84	68
11	30.08	72	68	84	75	75	84	27	30.22	68	60	66	45	45	70
12	30.30	57	57	93	81	81	87	28	30.36	70	65	70	60	83	94
13	30.38	60	56	79	70	81	93	29	30.30	73	69	94	81	90	95
14	30.18	57	55	93	93	93	93	30	30.02	71	59	90	90	48	57
15	30.00	69	66	100	75	75	84	31	30.20	62	55	68	44	48	68
16	29.94	56	54	68	57	68	68								57

Monthly mean relative humidity, 79½.

NOVEMBER, 1875.

Date.	Barometer.	Temp.		Relative humidity.				Date.	Barometer.	Temp.		Relative humidity.			
		12 m.	12 p. m.	8 a. m.	12 m.	8 p. m.	12 p. m.			12 m.	12 p. m.	8 a. m.	12 m.	8 p. m.	12 p. m.
1	30.28	64	61	53	73	70	76	16	30.02	75	68	90	69	75	79
2	30.12	70	64	70	67	90	88	17	30.34	57	45	62	48	71	75
3	30.16	70	67	78	79	84	84	18	30.40	57	56	85	81	93	100
4	30.28	74	67	94	72	84	90	19	30.30	69	69	94	84	94	90
5	29.06	74	51	94	63	87	93	20	30.16	76	66	95	69	90	94
6	30.22	54	51	86	86	93	93	21	30.20	73	63	95	81	94	88
7	30.04	65	61	87	90	88	88	22	30.44	57	55	68	68	81	79
8	30.12	56	52	86	81	79	86	23	30.44	62	59	87	78	94	94
9	30.28	58	53	73	70	81	93	24	30.38	65	60	94	73	83	81
10	29.88	70	55	84	84	81	87	25	30.46	66	58	76	70	81	93
11	30.18	60	52	68	66	87	79	26	30.22	65	62	94	94	90	94
12	30.34	63	56	87	52	30	93	27	30.30	63	62	87	78	83	83
13	30.28	65	65	93	68	88	90	28	30.34	66	61	83	78	83	83
14	29.98	70	66	84	84	94	90	29	30.20	64	62	81	78	83	88
15	29.92	70	68	94	90	84	90	30	30.20	54	51	87	93	93	71

Monthly mean relative humidity, 82½.

*Temperature and relative humidity, Port Royal Sound, S. C., &c.—Continued.*

DECEMBER, 1875.

Date.	Barometer.	Temp.		Relative humidity.					Date.	Barometer.	Temp.		Relative humidity.				
		12 m.	12 p. m.	8 a. m.	12 m.	8 p. m.	12 p. m.	Daily mean.			12 m.	12 p. m.	8 a. m.	12 m.	8 p. m.	12 p. m.	Daily mean.
1	30.18	55	47	93	93	85	92	90½	17	29.89	51	40	93	87	54	56	72½
2	30.18	52	55	93	93	93	93	93	18	30.36	31	39	59	59	56	56	57½
3	30.26	47	46	92	85	92	92	90½	19	30.44	46	45	52	48	77	92	67½
4	30.20	49	52	92	85	86	86	87½	20	30.64	56	53	91	81	48	86	76½
5	29.88	59	58	93	94	94	93	93½	21	30.58	66	54	93	73	81	93	85
6	29.92	60	59	93	81	94	94	90½	22	30.44	63	55	94	88	93	93	92
7	29.58	63	54	93	66	70	79	78½	23	30.30	69	57	94	75	87	93	87½
8	29.82	53	48	59	59	71	77	66½	24	30.18	62	57	88	83	93	87	87½
9	29.98	47	43	85	85	77	83	82½	25	30.18	60	58	93	61	93	93	90
10	30.22	53	45	91	59	77	92	79½	26	30.28	64	63	93	88	94	83	89
11	30.14	55	55	77	68	93	93	82½	27	30.30	65	60	94	87	88	94	90½
12	29.96	52	47	71	53	71	77	68	28	30.80	63	61	60	94	94	94	85½
13	29.90	59	49	71	44	43	48	51½	29	30.24	67	60	59	84	83	94	80
14	30.12	47	45	60	54	64	60	59½	30	30.38	66	65	94	94	94	94	94
15	30.26	51	51	56	59	71	71	64½	31	30.40	69	64	94	90	90	88	90½
16	30.20	58	59	77	76	87	81	80½									

Monthly mean relative humidity, 80½.

# **SOUTH ATLANTIC STATION.**



## SOUTH ATLANTIC STATION.

### U. S. FLAG-SHIP BROOKLYN.

#### REPORT OF SURGEON NEWTON L. BATES.

The Brooklyn is an auxiliary-screw steamer, built in 1858, of very moderate speed, but roomy and comfortable. The inner planking and knees in the sick-bay, as well as in other parts of the ship, are decaying, and her sanitary condition has not been good, although bilges have been closely looked after and every possible care taken to preserve the health of the crew. In the last year we have had yellow fever and small-pox on board, fortunately escaping with a single case of the latter disease.

The ship has a light spar-deck, which gives her very comfortable accommodations for the crew. The cubic air-space available is, on the berth-deck, 15,870, and on the gun-deck, 24,450 cubic feet. She has now on board a crew of 301 enlisted and appointed men, which allows 134 cubic feet for each man.

The crew does not suffer from deficient ventilation, except in bad weather, when ports and hatches must be closed. Arrangements, however, for the better ventilation of all our ships of war are greatly to be desired. The air-ports can be made larger, as in the British and other services, and, with the increased and more general use of steam, an abundant supply of fresh air can be secured, at moderate expense, by means of blowers, which should be arranged to exhaust or propel air, as desired, through pipes leading to different parts of the ship. The monitor system is the best we have, but may, I think, be improved; and I recommend the investigation of plans for ventilation, with the

adoption of such as seem most desirable for further experiment and report.

The total number of sick-days was .....	2,713
Average number on board .....	322
Sick remaining January 1, 1875 .....	5
Admitted during year .....	247
Sent to hospital .....	7
Died .....	9
Remaining December 31, 1875 .....	7
Percentage of sick .....	76.6
Percentage of mortality .....	2.8

The Brooklyn left Norfolk, Va., February 1, 1875, and arrived at Rio de Janeiro, Brazil, March 19. The remainder of the year she has been the flag-ship of the South Atlantic Station. Number of days at sea, 1875, 137.

While in port, fresh provisions have usually been given to the crew five times a week. I have known of no complaints as to the ration. General liberty was given once at Montevideo and special liberty at Rio de Janeiro as circumstances and the health of the city would warrant.

Water, in port, has been obtained by purchase; that obtained at Rio is of excellent quality. At Montevideo, one sample contained 18.5 grains chlorides and other salines per gallon, which although just perceptible to the taste produced no bad effects.

At St. Catharine's water was obtained from springs ashore and brought off in our own boats. It contained 7 grains salines per gallon and was of good quality.

On our arrival at Rio, March 19, I was informed by the health-officer that yellow fever was not prevailing as an epidemic; that there had been but few cases, and with the prevailing cool winds there was no danger. It was not until two or three days after that I found there were about ten deaths a day from this

disease. Great care had been taken in communicating with the shore, but coal and stores had been taken on board, at once, on arrival. We were ordered to await the arrival of the Lancaster, but on the 22d I advised the captain to go to sea. This was delayed on account of stormy weather until the 29th. On the 30th we arrived at Cabo Frio, an excellent harbor, open to the sea-breeze, which we found strong and constant. The ship was in excellent condition, and I had reason to believe that we would escape infection, when, on April 3, a man who had been exposed to foul air in a water-tank the day before, was seized with a slight chill, followed by high fever (temperature  $104^{\circ}$ ). This man had been employed in the hold and had not been out of the ship. At first the symptoms did not resemble those of yellow fever. A remission was noted within twenty-four hours after his first complaint, and throughout there was a troublesome tendency to diarrhœa. Albumen was found in the urine on the 5th in large quantities, and from the evening of the 5th there was total suppression. Death occurred on the 8th. Black vomit and yellow skin were not present until a few moments before death.

On the 5th a second case developed in a patient suffering from syphilitic cachexia. Suppression of urine in this case was followed by death on the 9th. The third death at this time, was from pneumonia, and as lung symptoms are not common in yellow fever, and the patient stated that he had once had yellow fever, it was thought that this was a case of uncomplicated pneumonia, but I subsequently decided that yellow-fever poison had been present in this case also, although well concealed by severe pneumonia. The 9th and 10th of April several new cases of yellow fever appeared, and in some of them there were well marked symptoms of pneumonia. In five, pneumonia was present, some with and others without symptoms of yellow fever. As there was no exposure sufficient to account for so

marked a tendency to pneumonia, I am disposed to regard it as a vagary of yellow-fever poison.

We left Cabo Frio April 6, standing to the southward. After reaching an average temperature of 70° no new cases developed, and by the time we arrived at Montevideo the ship was again healthy.

We were ordered to return to Rio; left Montevideo April 27, and arrived at Rio May 20. On June 12 we had another case of yellow fever, which was a direct effect of intoxication and exposure ashore at night. No other cases followed in a stay of nearly three months.

The Monongahela arrived at Rio April 19, and on the 22d Mr. Coleman was attacked with yellow fever, and died on the 28th. Mr. Coleman arrived at Rio April 10 in the Lancaster, and undoubtedly had the disease when he went on board the Monongahela on the 21st. The second case in the Monongahela, Assistant Surgeon Waugh, occurred the 27th, and other cases developed rapidly. The ship went to sea at once. Only two cases occurred afterward, both mild.

The Lancaster arrived at Rio April 10, and left on the 22d for the United States. On the 29th three cases of yellow fever developed within a few hours of each other, and May 4 the fourth and last case. All of these were officers; two of them were medical officers, and three died. Although the ship was in the tropics, the disease did not spread further.

Nearly all the conditions required to develop yellow fever are constant at Rio. In the central and thickly populated parts of the city the level between the hills is almost the same. The fall from Campo Acclamacao to the bay, a distance of more than a mile, through densely populated and narrow streets, is only 10 feet. The city has a sewer system, but in many places the beds have settled, leaving hollows, in which sewage matters accumulate. Many sewers empty where the current is im-



perceptible, or in eddies, and refuse thrown in from the wharves or coming from the sewers is left exposed to a tropical sun by receding tides. In a sanitary point of view Rio de Janeiro is badly situated, and it will require skilful engineering and be a tedious and costly work to render it healthy and safe.

In 1873, yellow fever appeared at Rio in January, and ceased to be epidemic about May 1. The total mortality from all causes for the year was 15,382; from yellow fever, 5,315. In one hospital of 806 patients treated for yellow fever, 193 died; in another, 158 were admitted and 39 died.

In 1874, the fever was not considered epidemic, and the city was healthy after May 15.

In 1875, January was a healthy month. In February, there were occasional deaths from yellow fever, and in March the deaths from this cause averaged about ten a day. In May, there were 314 deaths, and in June 104 from yellow fever. In July 50, and in the first half of August 7 deaths were reported. In this year the disease made its appearance later, and lasted much longer than usual. The average ratio of deaths to cases treated is nearly 1 to 4.

In any year, between the months of January and July, Rio is likely to prove unsafe for the unacclimated. Yellow fever is predicted, for the coming season, by medical residents of the city. There is danger of infection from stores and coal so long as the naval depot is in such an exposed situation, and until the sanitary condition of the city is improved the harbor should be avoided by ships of war for, at least, five months in the year. I think it advisable to remove our coal and stores to St. Catharine's, where there is good anchorage in a cool and healthy harbor, and many advantages for naval drills and exercises.

The hospitals at Rio de Janeiro and Montevideo were reported last year by Medical Inspector Denby. An effort is being made, with good prospect of success, to establish an Eng-

lish hospital at Rio de Janeiro for the use of the merchant marine as well as the navy. It is to be supported by the dues and fees of British vessels, and those who have the undertaking in charge will be very glad to unite with the United States Government to make it available for both nations. The Misericordia is very unpopular with the merchant service, and I recommend the undertaking as being well worthy of support.

We have many naval officers and men interred in the various cemeteries of Rio. The English cemetery is so nearly full that we cannot use it, and the Brazilian custom is to sell or lease a grave for a term of years, so that, unless renewed and cared for by some one interested, it may, in a few years, be again occupied. An American cemetery and a British-American hospital are greatly needed with our large commerce with Rio.

In September, the Brooklyn visited St. Catharine's, already referred to as an excellent harbor and a desirable place for the establishment of a naval depot; thence went to Montevideo, where she remained until recalled, November 17, to the United States. We were again at Rio de Janeiro from the 4th to the 7th December. The city was then healthy.

I have further to recommend an increase in the pay of nurses who have served three years as such and deserve promotion. A good man does not care to make a second cruise on landsman's pay, and that of seaman would retain in the sick-bay men who have had experience and training.

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#### U. S. S. MONONGAHELA.

##### REPORT OF SURGEON ADOLPH A. HOEHLING.

*Hygiene.*—Complement of officers and men, 243; the cubic air-space allowed each individual was given in my sanitary report, dated January 1, 1874; percentage of sickness, 1.0452; of mortality, .004115.

Ventilation is deficient in the after part of the wardroom, bad in the steerages, and very bad indeed on the berth-deck when the sea is at all rough, necessitating the closure of the ports; it is also bad in the fore-castle. If the galley could be transferred to the spar-deck the berth-deck would be more habitable. While near the equator the temperature on the latter was, at one time, 102° F., and on the former only 80° F. The wardroom and steerage smell of bilge-gases much of the time, and under the former the bilge is not accessible to brooms and scrapers. The lower half of the door of the brig should be pierced with holes, as is the upper half, because the carbonic acid collects on the deck where the prisoners lie. The air-ports are barely of any use for ventilation. They are so close to the surface that water is dashed in even at anchor. The above-mentioned defects have produced three cases of phthisis and many of adynamia on board. All our cases of any moment assume the latter type, and a large number have become the objects of medical survey in consequence. The automatic bilge-air pump, which we have forward, does excellent service, and we could use one amidships and another aft with benefit. Its construction might be improved, as it often gets out of order. Every ship ought to have a flush berth-deck, the want of which adds to the impurity of the air on board this ship. Curtains in the officers' quarters cut off much fresh air, especially on the bulkhead between the wardroom and steerage country. Pierced iron gauze, as on board Her Majesty's ship *Amethyst*, would be better.

Lighting is as good as usual in vessels not of the latest pattern. On board Her Majesty's ships *Volage* and *Amethyst* I saw the window air-ports, which give an abundance of light and air in port, and can often be used at sea, in moderate weather. If the air-ports of this ship are renewed before another cruise, and their leaky condition renders this desirable, it would be well to enlarge their diameter, if only for the transmission of

more light. For ventilation they can seldom be used, as stated before.

Warming is very good by means of steam-pipes.

Water is sometimes distilled on board, and this is now done slowly, whereby an excellent article is procured. When the hot water is run into the tanks in the hold it heats the water in adjoining tanks, provisions, and the berth-deck. This could be obviated, and cool, well aerated water obtained by having a receiving-tank on the spar-deck. The water received from water-boats has generally been somewhat bad, except at Rio de Janeiro, Brazil. At Jamestown, island of St. Helena, it contained 15 grains of sodium chloride per gallon when received, and became more saline as the bottoms of the tanks were reached, when it was almost unfit for use. The price was very low, viz, 3 shillings and 7 pence per tun of 252 imperial gallons. At Pernambuco, Brazil, the water was good on shore, but our ship was anchored so far out that from 4 to 8 cents per gallon was asked to supply her, and none was purchased. This is a common difficulty in the port.

At Bahia, Brazil, the water received from water-boats was good, containing only 5 grains of sodium chloride per gallon. I rejected one boat whose water contained 20 grains per gallon of sodium chloride. This was probably a leaky boat, no uncommon thing. At Rio de Janeiro we found the water entirely free from impurities, and containing no sodium chloride. At Maldonado, Uruguay, the only water we could reach was too impure for use, owing to cattle walking about in it. At St. Catharine's Island, Brazil, good water is to be found near the fort. At Montevideo, Uruguay, we found the water bad on shore, and worse in water-boats. It comes 34 miles, from the St. Lucia River, is quite hard, and contains from 8 to 15 grains of sodium chloride per gallon, varying with the water-boats. At Bridgetown, Barbadoes Island, excellent water is delivered

on board for 60 cents per 100 gallons. That which I tested contained 3 grains of sodium chloride per gallon, and this probably got into it in the water-boat. A trace of lime was also found, but no organic impurities. It comes next the Rio water in quality.

Food is good in all respects.

Clothing is good, except sailor caps, which are too low for tropical weather. I believe the white pantaloons should only be worn in very hot weather. To guard against colds and rheumatism, perhaps a flannel suit would be better even in hot weather, as the preservation of white suits causes much inconvenience, especially when they are not worn for a long time, and they are of doubtful utility when worn.

This is an unhealthy ship, more so than any other on which I have served; and she is not adapted for essentially unhealthy climates, such as Brazil and the West Indies possess, except in time of actual war, when the stricter sanitary considerations must, of course, yield to more important necessities. We have a much larger complement than the United States ship Brooklyn, in proportion to the room we have for berthing our crew; and out of a crew of 216, many sleep in odd places, because if all the hammock-hooks were occupied, there would not be room to turn in. The number of medical surveys has been large, and many of our crew look pale and are physically below par. Olive oil, which drips off the engine, causes a foul bilge, by reason of the decomposition of vegetable impurities contained in the crude article. Chief Engineer H. L. Snyder proposes to arrange drip-pans to catch the oil, and he believes that metallic carpeting over such portions of the bilge as are reached by oil would facilitate its removal before decomposition takes place, which is impossible when it meets absorbent wood. A sick-bay, or some permanent place for the sick, is much needed. Sailors are not humane to their sick comrades

as a rule, and when I have very sick men placed under the top-gallant fore-castle, the men whose billets are appropriated make trouble, which cannot fail to be injurious to a debilitated invalid whose mind is already depressed by his illness. Recently, a patient affected with phthisis was placed, during a violent paroxysm of dyspnoea, in an airy billet on the spar-deck, which is usually occupied by an aged, gray-headed petty officer. The latter became angry and said that he wished the patient were dead and overboard, so that he could not obstruct the billet alluded to. About the same time, a marine affected with disease of the mitral valve of the heart was removed from the stifling berth-deck to the fore-castle, whereupon the seaman acting as second captain of that part of the ship unhooked the patient's hammock and threw it upon the deck, asserting that it should not interfere with the billet of a man who stood a watch under him. The discomforts attending an over crowded vessel may partly explain this feeling toward the sick. Malingering and enlistment with concealed diseases produce much loss of service from men morally worthless, which causes them to magnify moderate ailments into disabilities. It would be well to endorse the discharge-papers of men with their relative fondness for the sick-list during the cruise. The certificate for the recruit's signature, on Form Q, does not always accomplish the purpose intended, as I have had men with epilepsy, strictura urethrae, and syphilitic constitution on board this ship, as well as one case of *filaria Guineensis*, in all of which the men knew that the infirmity existed when the certificate was falsely signed. Their usual excuse is that the disease did not trouble them just then. Very old and young persons make poor material for a ship's company, and of these extremes a large part of our crew consists. A good chest-measure is of vast importance in the *ensemble* of a recruit.

The following table exhibits the differences in temperature between the berth-deck and spar-deck for 9 days:

*Temperature table.*

Date.	Hour.	Temperature, Fah.		Date.	Hour.	Temperature, Fah.	
		Berth-deck.	Spar-deck.			Berth-deck.	Spar-deck.
December 8.....	7 p. m.	86	80	December 12.....	9 a. m.	87	82
	8 p. m.	85	79		10 a. m.	88	82
	9 p. m.	83	79		11 a. m.	88	83
	10 p. m.	82	79		12 m.	88	83
December 9.....	7 a. m.	82	76		1 p. m.	87	82
	8 a. m.	86	75		2 p. m.	87	80
	9 a. m.	85	79		3 p. m.	88	80
	10 a. m.	86	81		4 p. m.	87	80
	11 a. m.	88	81		5 p. m.	88	80
	12 m'd't	88	81		6 p. m.	88	80
	1 p. m.	84	80		7 p. m.	88	80
	2 p. m.	86	80		8 p. m.	86	80
	3 p. m.	86	81		9 p. m.	88	80
	4 p. m.	86	80		10 p. m.	88	80
	5 p. m.	90	80		11 p. m.	88	80
	6 p. m.	86	80		12 m'd't	90	80
December 10.....	7 p. m.	82	79	December 13.....	2 a. m.	90	79
	8 p. m.	83	79		4 a. m.	88	79
	9 p. m.	82	79		6 a. m.	90	79
	10 p. m.	82	78		7 a. m.	93	80
	7 a. m.	82	78		8 a. m.	88	80
	8 a. m.	82	78		9 a. m.	88	81
	9 a. m.	82	79		10 a. m.	88	83
	10 a. m.	83	80		11 a. m.	89	83
	11 a. m.	83	80		12 m.	90	83
	12 m'd't	84	80		1 p. m.	90	83
	1 p. m.	83	78		2 p. m.	88	83
	2 p. m.	83	78		3 p. m.	86	83
December 11.....	3 p. m.	82	78		4 p. m.	88	83
	4 p. m.	84	78		5 p. m.	86	82
	5 p. m.	83	78		6 p. m.	89	82
	6 p. m.	84	77		7 p. m.	91	81
	7 p. m.	84	78		8 p. m.	90	81
	8 p. m.	85	79		9 p. m.	88	81
	9 p. m.	85	78		10 p. m.	90	81
	10 p. m.	84	78		12 m'd't	90	81
	7 a. m.	86	79	December 14.....	6 a. m.	102	80
	8 a. m.	86	80		7 a. m.	94	80
	9 a. m.	85	81		8 a. m.	88	80
	10 a. m.	83	81		9 a. m.	88	81
	11 a. m.	86	81		10 a. m.	88	82
	12 m'd't	86	83		11 a. m.	90	82
	1 p. m.	85	82		12 m.	92	82
	2 p. m.	84	81		1 p. m.	92	83
	3 p. m.	84	81		2 p. m.	90	83
	4 p. m.	83	81		3 p. m.	93	83
	5 p. m.	86	81		4 p. m.	93	82
	6 p. m.	84	81		5 p. m.	90	82
December 12.....	7 p. m.	85	80		6 p. m.	88	81
	8 p. m.	84	80		7 p. m.	88	81
	9 p. m.	85	81		8 p. m.	89	81
	10 p. m.	85	81		9 p. m.	89	81
	7 a. m.	85	79		12 m'd't	85	81
	8 a. m.	86	81				

Temperature table—Continued.

Date.	Hour.	Temperature, Fah.		Date.	Hour.	Temperature, Fah.	
		In the "brig."	Spar-deck.			In the "brig."	Spar-deck.
December 15.....	6 a. m.	92	80	December 16.....	6 a. m.	90	80
	7 a. m.	90	80		7 a. m.	88	80
	8 a. m.	88	80		8 a. m.	88	80
	9 a. m.	88	81		9 a. m.	87	81
	10 a. m.	88	82		10 a. m.	88	82
	11 a. m.	90	82		11 a. m.	88	83
	12 m.	90	83		12 m.	89	83
	1 p. m.	89	83		1 p. m.	89	83
	2 p. m.	88	83		2 p. m.	90	83
	3 p. m.	88	83		3 p. m.	90	83
	4 p. m.	89	83		4 p. m.	89	83
	5 p. m.	89	82		5 p. m.	89	82
	6 p. m.	88	82		6 p. m.	88	82
	7 p. m.	87	81		7 p. m.	89	82
	8 p. m.	87	81		8 p. m.	90	82
	9 p. m.	86	81		9 p. m.	89	82
	10 p. m.	86	81		10 p. m.	90	81

From a consideration of the foregoing figures, I believe that it would be well to remove the galley to the spar-deck, and provide better ventilation for the berth-deck before this ship is recommissioned for another cruise. If the above alterations are made, it would also be proper to make the bilge accessible in all its parts, particularly under the wardroom, at the same time, as well as to provide better ventilation for the steerages and after part of the wardroom and fore-castle than now exists.

*Medical topography.*—On March 11 we arrived at Jamestown, island of St. Helena. This is a rather barren island, but the climate is, on the whole, healthy. Typhoid fever often prevails, owing to open sewers and probably to bad water. The population is estimated to number from 5,500 to 6,000, mostly Malay, English, and negro. High winds in the shape of squalls are very frequent. The temperature ranges from 56° to 80° Fah. Jamestown has a civil and a military hospital. In the



former, sick seamen are received gratis. "In one year 314 seamen were received in this hospital and provided for without expense to the ships."—(*Port Circular*.) The building is not shaded, while the military hospital stands in a bower of shade-trees. Vessels in quarantine must be moored to the westward of the harbor, and the rule against landing before pratique has been given is strictly enforced. The quarantine fee is 15 shillings for the day, and the same per night. The room at Longwood, in which Napoleon I died, is very damp, as is easily to be seen from the condition of the floor and wall-paper. Very high winds prevail in that part of the island during the winter. The island is too small to support all born upon it, and many emigrate every year. Since the completion of the Suez Canal there is a scarcity of shipping and money. American whalers still come, and we found five at anchor. The steamers plying between Capetown and England stop at James-town on the way to England, and the steamer leaving England on the 15th of each month for Capetown stops there also. The highest peak on the island is named Diana, and is 2,697 feet above the level of the sea.

On April 1 we arrived at Pernambuco, Brazil, where we heard of a few cases of yellow and more of malarial fever on shore and in the shipping; we anchored well away from both. This city has 40,000 inhabitants. Yellow fever has become endemic; in 1873 the summer was distinguished by a very severe epidemic. The disease was treated very successfully during the present summer by Dr. King at the English Hospital; he lost only one out of twelve cases. He begins the treatment with pulv. ipecac, ℞j; if this does not move the bowels, with its other effects, Ol. ricini ℥ss is administered at once; if the skin does not act a vapor-bath comes next in order. Rice-water is given *ad libitum*, and no other food whatever. As specific treatment, he gives a drink containing

sodæ sulpho-carbolatis, gr. x, ad aquæ, 3j; this imperial he gives during the first four or more days. In the autopsies he has always found the liver diseased; sometimes there was fatty degeneration, in the worst cases, cirrhosis; in the worst cases suppression of urine was almost always present. This summer from 150 to 200 persons died of the disease; most of the cases occurred in the shipping; five days is the shortest period of incubation known here, and vessels which become infected are usually here from five to ten days before the disease appears on board. The gentleman before named believes the disease to be true febris flava, and moderately contagious. There is also considerable variola in this city at times. The following hospitals are located here: 1st. English, with 54 beds, having 1,200 cubic feet of air-space each; here contagious diseases are separated from others; in all the rest of the hospitals the cases are mixed together indiscriminately, as at Rio de Janeiro. 2d. Portuguese, 100 beds. 3d. Brazilian, 270 beds; also an army, a naval, and a church hospital. In the first the charges are 3 milreis (about \$1.62) per day in the wards, and 6 milreis per patient in a first-class room, with sitting-room and extra services. There are no medical journals, colleges, or institutions of learning here.

On April 9 we arrived at Bahia, Brazil. There is a little endemic yellow fever here most of the time, but the place was healthy during our stay. The United States steamer Swatara, on her way to Capetown and Kerguelen Land, in 1874, left Chief Photographer Sehbohm, of the Transit of Venus party, here, on account of violent nausea marina, and gastric irritation; he soon took the febris flava on shore, and died of it; he was terribly afraid of the fever after he got on shore. Bahia has 140,000 inhabitants, five hospitals, and the leading medical college of Brazil, whose course of studies, etc., were described in my sanitary report dated January 1, 1874. The Hospital da

Carida will hold 1,000 or more patients. The Montserrat is for yellow and other severe fevers; a Portuguese, an army, and a naval hospital are also situate here. I can say nothing in favor of Brazilian hospitals except that they are somewhat convenient to send contagious diseases to, as they will receive all kinds of diseases in almost any public ward; this plan is a very bad one for the other patients, however, and not to be recommended for imitation. Febris intermittens is quite prevalent at Bahia, but yellow fever does not usually make much headway except when the disease is imported in addition to what exists endemically.

On the 19th of April we arrived at Rio de Janeiro again; we found yellow fever very prevalent at this time. In my sanitary reports of January 1, 1874, and 1875, I have described this port at length, and will now confine my remarks to an outbreak of yellow fever which we had during our present visit. Nine persons died of the fever in Rio on April 20, and "gastric" and common malarial fevers prevailed to an uncomfortable degree. Mr. Samuel M. Coleman, secretary to the commander of the squadron, was taken with an attack of yellow fever on board this ship on April 22, and soon the disease seized others. This was the third time this vessel had had the disease on board in Rio Harbor, and I gave a description thereof in my communication to the bureau dated May 13, 1875, No. 7. As Mr. Coleman had only been on board a little over one day, and this ship had only been in the infected harbor three days when the disease appeared, I concluded that he brought the disease with him from the United States ship Lancaster, where he had passed ten days before he came to us. The Lancaster had proceeded to sea without a sign of the fever, but I informed the admiral that I thought the yellow fever would make its appearance on board before she got far north, and the event proved this opinion to be correct. I am therefore confirmed in my belief that

the patient above named brought the disease to us from the United States ship Lancaster, or from the city, where he had visited while domiciled on board the latter ship during his sojourn of ten days above mentioned. It appears that the cases on board the Lancaster broke out a few days later than that just mentioned. This may be accounted for by the fact that our ship remained in the infected harbor, where fresh poison was continuously inhaled, while the Lancaster proceeded to sea before a single case had completed incubation. Had she gone into a cool instead of a hot latitude, the disease would have assumed a milder type than it did. The spread of the disease on board this ship favors the theory of contagion, in which I am a firm believer. Some of our cases were pronounced malarial fever at the hospital, and the nature of Rio yellow fever is far from being settled; the natives inclining to the belief that it is not contagious, and consequently is akin to paludal yellow fever, while foreign physicians recognize the existence of true febris flava, with contagion. If it were not for the cases in which I have seen it communicated by the latter agency, and two cases in which I have viewed the characteristic black vomit, followed by *post-mortem jaundice*, I also would hesitate in forming an opinion. Some cases, attended with albuminuria, end in intermittent fever, as occurred in an instance on board Her Majesty's ship Amethyst, thus proving its malarial character. The men who died on board Her Majesty's ship Egmont in May and June, 1874, had great engorgement of the spleen, with full bladders, and albumen was present in the urine in "a few cases," as mentioned in my sanitary report, dated January 1, 1875. The nature of the latter cases has not yet been satisfactorily settled by the medical men interested. I think we may conclude that many cases of paludal yellow fever occur here, and ordinarily some cases of true febris flava, especially in the shipping; and that in epidemic years, as were 1869, '70, '72, and '73,

the contagious febris flava predominated. Conjunctival congestion under the upper eyelid and albuminuria are regarded as pretty sure signs of true yellow fever at Rio, but they are not infallible. The native physicians regard a moist tongue as indicative of remittent fever, but Mr. Coleman had a moist, slightly furred, indented tongue, and had other symptoms of remittent fever, yet he died with black vomit, and had extensive post-mortem jaundice. He had retention of urine a few hours before death, when over a pint was removed with a catheter, and found to be loaded with albumen. If it were not for the fact that febris flava did break out on board the Lancaster, I should have almost believed that this patient first had remittent fever, and that yellow fever seized him while under the influence of the former disease, on board this ship, which had been infected on two previous occasions. My own seizure was clearly the result of contagion, having the proper period of incubation, with no malarial symptoms during or after the attack. The only infallible sign of febris flava is the want of a true remission, but the existence of an apparent amelioration of the febrile symptoms, as described by Dr. George B. Wood in his "Treatise on the Practice of Medicine." This "delusive calm" must be seen to be fully appreciated, and once seen is not likely to be forgotten. It comes on from a few hours to three or more days after the beginning of the disease, so that it is almost impossible to make a positive diagnosis when the fever begins.

The hospitals at Rio are all bad, and those under private management are exorbitant in their charges, and add unexpected extra charges to the bill when it is presented. The British naval surgeons have orders to send only contagious cases to hospitals at Rio. Patients are neglected at all of the latter, and often take yellow fever and die, when sent with other diseases. A sailor from Her Majesty's ship Ready was sent to the Misericordia with a fracture, and died there of

yellow fever. An officer of one of the English steamships was sent to the St. Sebastiao by Dr. W. J. Fairbairne of Rio, with laceration of the perineum, and died of yellow fever contracted in the institution.

The physician above named recently informed me that a hospital for the British and Americans will shortly be opened at San Domingo, opposite Rio, and it is hoped that the shipping of the two nations visiting the latter city will pay about 1 penny per ton toward its maintenance, and support it with patients. Such an institution is much to be desired at this port.

On May 19 we arrived at Maldonado, Uruguay, where we were quarantined for six days, all vessels coming from Rio at this time being treated thus at Montevideo as well as at the port above mentioned. The town was full of typhoid fever, due to the use of impure water. It is a small, mean town, having no medical man of capacity, so the authorities were compelled to send abroad for a physician to diagnose the disease above mentioned when it first appeared.

On June 12 we arrived near Desterro, on the island of St. Catharine's, Brazil. The climate is excellent, and healthy. There is no yellow fever. A good hospital building is situate here, but the physicians of the place have not the confidence of the foreign residents. In my sanitary report dated January 1, 1875, I recommended Cape Frio as a sanitarium for our ships when infected at Rio de Janeiro; but the experience of the United States ship Brooklyn in April, 1875, did not confirm this favorable view, as her first cases of yellow fever broke out here, though the infection probably took place at Rio, whence she had recently come on account of the prevalence of the disease in that harbor. I would now almost be tempted to recommend St. Catharine's Island for the same purpose were it not

for the excellent results this ship had from going directly south until a temperature below 70° Fah. was reached.

On July 10 we arrived at Montevideo, Uruguay. This city had 105,296 inhabitants in 1872, and the numbers are now estimated as high as 120,000; but many of these are absent at present on account of a revolution which is disturbing the nation. High winds prevail here, and the city is fairly healthy, though an epidemic of erysipelas existed when we arrived. Variola is not uncommon here. In 1857 the city was visited by yellow fever, and over 3,000 died of it; in 1873 it appeared again, but with less violence. The cholera caused a considerable mortality here in 1868. Deaths average about 29 per thousand, and at the rate of 93 whites to 7 colored. Of the total deaths, 42 per centum are under the age of two years; the bad drinking-water may have some agency in this great mortality among infants. The average above given is for the year; the daily number of deaths is about 8. A bad smell is often perceived in the harbor from the saladeros, or slaughter-houses, at the foot of the cerro, or mount. The city contains two good hospitals: The Caridad has a frontage of 100 yards, and covers 1½ English acres; it is three stories high, and can accommodate 300 patients comfortably; now it contains 400, and is crowded; in 1874 there were admitted 4,655, of whom 3,990 were discharged as cured, 338 died, and 327 remained under treatment at the end of the year. There is a large chapel in the building. The hospital is under the care of Sisters of Charity, who have comfortable quarters in the house. A foundling-window exists in the institution, the infants being put out to board. An army and navy and prison ward are also situate in the establishment. Patients are received gratis, except a few who have private rooms for \$1 a day, about \$1.04 of our gold coin. The Beneficencia lottery, aided by government, supports the Caridad. There is no system of artificial ventilation, but the

high winds here, as at the New Somerset Hospital in Capetown, render this unnecessary. I perceived no smell in the wards of a disagreeable character. The modern surgical, medical, and mechanical appliances for diagnosis and treatment were on hand, and the outfit of the dispensary was rather elegant. The linen-room was perfect; every patient is provided with clean linen when admitted. Prescribing here, as in the city at large, is attended with one imperfection, there being no adopted pharmacopœia; each physician follows that of the country in which he studied medicine. In the city accidents have been known to occur in consequence of not stating which pharmacopœia was intended by the prescriber on his prescription. Wounds are not unfrequently attacked by erysipelas in the wards, and for surgical operations the patient is usually placed in a private room, if one can be spared; hospital gangrene is not endemic in the house. The British Hospital contains 60 beds, placed in five wards, which are well aired. This is used by the British and our own Navy when hospital accommodation is required for patients.

In addition to the Caridad, the following institutions are under the care of Sisters of Charity: An orphan asylum, with 286 inmates; a refuge for the poor, with 156 inmates; an insane asylum, with 181 patients; and the Jackson Orphan Asylum, for females to the number of 60, which was endowed by an English resident of that name.

Quarantine matters are in charge of the captain of the port and his physicians, and vessels from Rio de Janeiro are the most particular objects of their solicitude. The lazaret and quarantine anchorage are at Flores Island, about 12 miles from the city, towards the mouth of the river. This island has a boarding-house for passengers in quarantined vessels, also a light-house 114 feet above the level of the sea.

The city possesses a small museum of natural history and a



fair library. There is also a university here, but it has no chairs for instruction in medicine. A medical faculty is attached to it, whose province is the examination of medical graduates from other countries and the granting of degrees to such as pass successfully

On December 28 we arrived at Bridgetown, Barbadoes Island. The latter is nearly 21 English miles long by 14 miles wide, containing about 166 square miles, of which 106,470 acres are under cultivation. Its population is now estimated at 170,000 to 180,000, and is very largely composed of negroes. In 1857 there were 79,000 negroes to 23,000 white inhabitants. I was informed that the death-rate is about 10 per thousand annually. This is probably too low, but no statistics on the subject were available during my visit of a few hours. The island is considered very healthy, epidemics never having appeared except as the result of importation. *Febris intermittens* exists to a small extent; *remittens* is rather frequent. *Febris flava* was epidemic during the summer of 1852-'53. *Cholera Asiatica* carried off 22,000 lives in four months of the year 1854. The yellow fever is called the white man's disease; the cholera, the negro's disease. Ships of the British North American squadron often come here, and formerly their men suffered greatly from venereal diseases contracted on shore. This has been much improved by the weekly examination of prostitutes at the Lock Hospital, where they are obliged to procure a certificate of health, although their vocation is not actually licensed. There is a good general hospital here, containing about 300 beds; an army and a naval hospital, as well as several charitable dispensaries, which are supported by citizens, a ladies' society, St. Paul's Episcopal Church, and treasury grants; also, the Codrington College of Theology, endowed, where about 100 students attend. It is under the Church of England. The

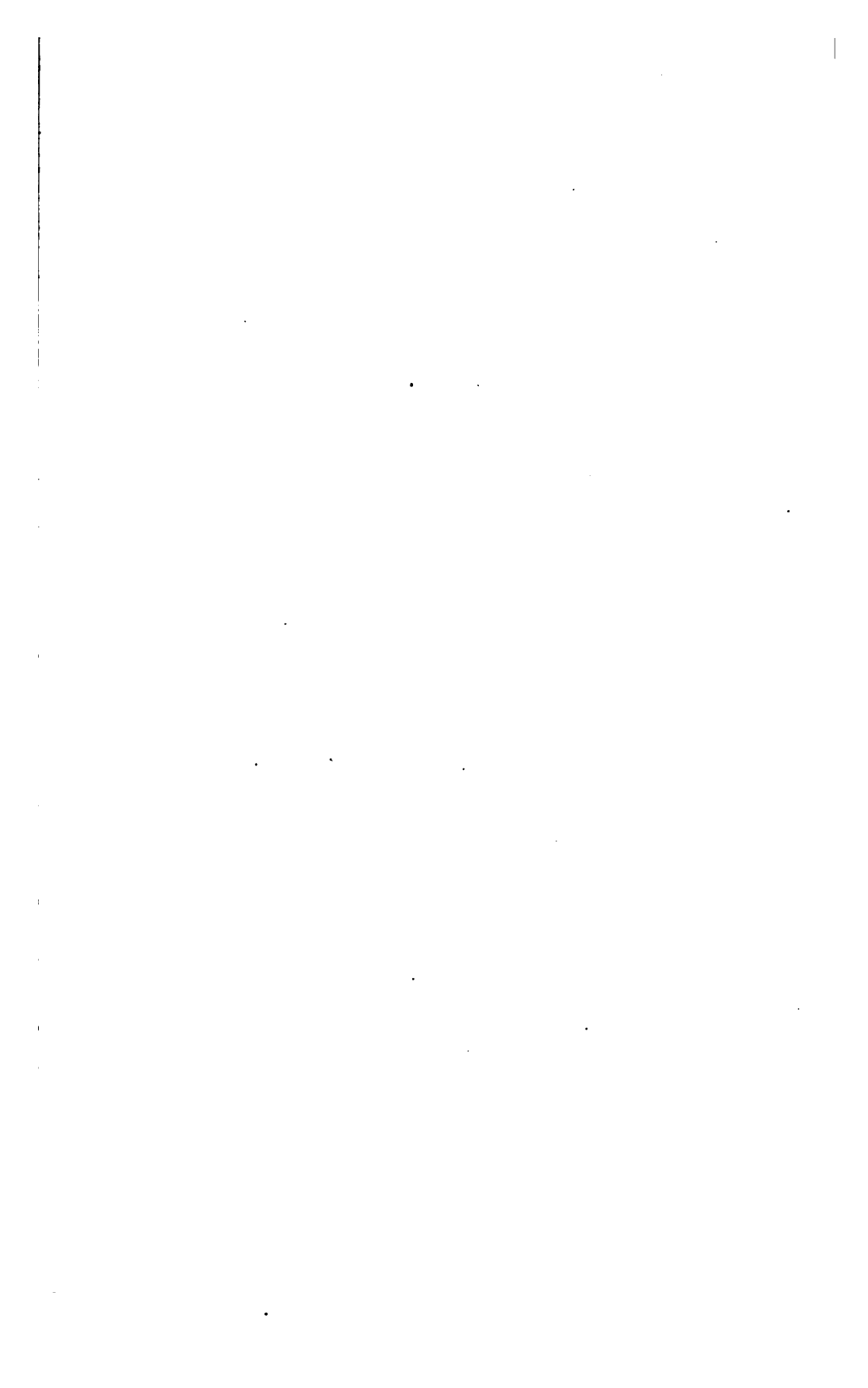
medical men are nearly all licentiates of Guy's Hospital College, London, and Edinburgh Colleges.

The harbor-master performs the duty of visiting quarantine officer, and for his certificate merchant-ships pay \$3.

Cable communication exists with Demerara, British Guiana, the West India Islands, United States of America, Canada, and Europe. Direct lines extend to the first two; the communication with the rest is indirect. A monthly mail is exchanged with the United States, via St. Thomas Island; but papers are received very often from sailing-vessels which come out of our ports. The great majority of vessels we saw in the harbor flew the American flag. The principal articles exported from the island are coffee, sugar, rum, and cotton. Vegetables for the table are not abundant, but considerable beef is imported from the United States, on ice.

Before concluding this report, I would respectfully recommend that, when the present cruise has expired, this vessel's berth-deck, after bilges, brig, and wardroom water-closets be examined by a mixed board of survey. As I have stated before, the galley on the berth-deck and the inaccessibility of the after bilges have proved injurious to health on board this ship. The closets should be moved some feet further aft and widened. The brig is too small and dark, and needs a ventilating-tube opening through its ceiling; with every care it cannot now be kept free from a bad smell when tenanted.

EUROPEAN STATION.



## EUROPEAN STATION.

U. S. S. JUNIATA.

REPORT OF SURGEON THOMAS C. WALTON.

*Hygiene.*—Complement of officers, 20; of men, 198. The diminution since the last report is accounted for by the withdrawal of midshipmen from the vessel and the decrease in the complement of the crew by order of the Navy Department.

Cubic air-space allowed each individual on shipboard.—No change has been made during the past year in the air-space allowed the commissioned and warrant officers, except, since the detachment of the midshipmen, more has been enjoyed by the occupants of the steerage. Since the diminution in the complement of men, each man of the 140 sleeping on the berth-deck has about 64 cubic feet of breathing-space, allowing 7 cubic feet for the space occupied by each man with his hammock and bedding; the remaining 58 sleeping in the forecastle have about 100 cubic feet each. The hammock-hooks are placed 14 inches apart, which necessitates the swinging of the hammocks in two tiers in many places when "all hands sleep in." There is no sick-bay; extra space for the sick or for a cot can only be obtained by greater crowding of the crew. The attention of the bureau is respectfully called to the foregoing facts, in view of the extensive repairs this vessel will require before she can make another cruise.

The number of persons admitted on the sick-list during the year was 133, or 61 per 100 of those on board. The average length of time of each on the list was 12.44 days. There was 1 death on board during the year, being .45 per 100 of the complement and .75 per 100 of admissions. The rate, how-

ever, would be more correctly represented by .91 and 1.5 per 100, owing to the death of a marine in a foreign hospital (Southampton, England) shortly after his transfer from this ship, and not accounted in its medical record, official notice of the death not having been received on board. There were transferred from the ship during the year, on account of sickness, 6 persons, being 2.75 per 100 of the complement, and 4.51 per 100 of the sick.

The cabin, wardroom, and steerage are fairly ventilated and lighted, better than in the majority of our vessels-of-war. The berth-deck is sadly deficient in both respects. A minute description of it was given in the sanitary report of January 1, 1874. It is a subject for congratulation that more sickness has not occurred among the crew on account of these defects. Suggestions for improvement will be made further on.

Warming is sufficient in amount and means except in very cold weather, when special means could be improvised.

Distilled water is used. An apparatus for aerating it is required. The means of preservation are too limited; the longest interval without distilling is four days.

The ration, with the fresh potatoes that the crew usually provide for themselves, is apparently sufficient in amount and variety for cruising in temperate latitudes. Within the tropics a portion of the meat might be advantageously commuted for vegetables and fruit. The coffee supplied is of fair quality, but is miserable when served to the crew, owing to defective preparation. A special apparatus for preparing it might be attached to the galley, and more attention bestowed on its preparation. The tea is usually of an inferior grade, and the allowance about one-half too small. The preserved meat is unpopular and unpalatable; a more palatable and probably more nutritious article is that preserved in fat, after a method adopted by some Australian meat-preserving companies, and retailed at

reasonable price in many European cities. If potatoes cannot be supplied to the crew when at sea by the paymaster, authority should be given by regulation for the storing of them by each mess before starting on a cruise.

During the past year the crew have obtained most of their clothing by private purchase, under the direction of their divisional officers, and have generally secured better articles at less cost than those supplied on board. For defects, attention is directed to the sanitary reports from this vessel for the past two years.

Should this vessel be partially reconstructed, a flush berth-deck would afford much more room and better ventilation for the crew; or, if so extensive a change were impracticable, the extension of the top-gallant fore-castle further aft, and the construction of a hatchway leading to the after part of the berth-deck, also the elevation of the ventilators of said deck above the ship's rail, would be an improvement. An addition to the keel of the ship might be made, to remedy her rolling propensities, and in doing so her bilges should be improved. The bilges beneath the powder-magazines cannot be got at except through the magazine-floors. A similar defect exists in those beneath some of the store-rooms, and many of them cannot be ventilated or cleaned except with the greatest difficulty. The after part of the ship has not been free from odor from the bilge during the entire cruise, the cause, probably, existing beneath the magazines, as every other part has been frequently cleansed and disinfected.

Two cases of enteric fever have occurred among the crew during the year; a marked tendency to phthisis pulmonalis exists among six others, and furuncular affections have been common. How far these diseases have been induced by the overcrowded sleeping accommodations of the men, it is impossible to determine, and owing to this limited accommodation it is

impossible to obtain any space on board at all desirable for the treatment of cases of serious illness.

*Foreign men-of-war.*—In June last, while in the harbour of Lisbon, Portugal, an opportunity was afforded to visit the English armour-plated screw vessel-of-war Sultan, which, with five other powerful iron-clads, constituted the "Channel Squadron" at that time.

The Sultan is considered the most modern of English war-vessels, and is said to embody all of the most recent improvements in naval architecture. She is 320 feet long, 50 feet beam, 9,286 tons displacement; indicated horse-power of engines 8,629; maximum attained speed at sea  $14\frac{1}{2}$  knots per hour. She carries on her spar-deck 4 rifle muzzle-loading guns, 12 tons each; two of them are in the forecastle and train forward, the other two are located amidships and can be trained either fore or aft. They cross fire at 300 yards. On the main deck is a battery of 8 guns, of 18 tons each; 4 are placed on each side, abreast the main-mast. This battery is protected by iron plating 12 inches thick, backed by 10 inches of teak, extending from the hammock-rail to below the water-line, and over about two-thirds of the length of the vessel's side. The remaining one-third is covered with plating varying from 4 to 8 inches in thickness, thickest at the water-line. The decks are made of  $\frac{5}{8}$ -inch iron, covered with wood, and supported by iron beams. The main or gun deck is divided into 8 water-tight compartments. Pumps are affixed to each of them, by which water can be pumped in or out. Some of the pumps can be worked by steam. The lower compartments are all well ventilated by means of hatchways, air-shafts, and hollow masts. The body of the ship, that is, the part beneath the battery, engine and fire rooms, has a double bottom. The inner bottom is about 4 feet from the outer one. It is supported by iron ribs and braces or keelsons that divide the intervening space into cubes, measuring



about 4 feet on a side. There are about 500 of these cubes. They communicate with each other by man-holes. They are supposed ordinarily to be dry, and it was said they could speedily be emptied or filled with water, as occasion might require, by means of numerous pumps and hose attachments. Along each side of the keel is laid an iron tube, of large size, communicating with a well. These tubes have numerous traps and valves, and are intended to collect all the bilge-water of the vessel and convey it to the well, where it can be readily detected and pumped out. Forward of the double bottom a quantity of concrete is laid on the true bottom, to add to the weight and increase the stability of the latter. From this forward projects a powerful ram. The battery can be discharged by electricity. The vessel can be steered from either above or below the water-line, either by the ordinary appliances or by steam, the latter having the advantage of celerity and facility of management.

The crew numbered about 600. Their berthing accommodations are excellent. The boys, servants, marines, fire and engine room men, and the sailors, occupy separate "flats" or compartments while sleeping. Each department is supplied with bath-tubs and had a liberal allowance of fresh water. The "heads" are under cover, and kept fairly clean by means of disinfectants and an almost steady flowing stream of water.

The sick-bay is located in and on each side of a compartment on the gun-deck, immediately forward of the mizzen-mast; the intervening space or "country" could be readily embraced. This compartment is one of the most suitable in the ship; its ventilation and lighting are perfect; complete isolation of the sick can be obtained in it, and freedom from most of the annoyances of ship-life secured. The chief drawback noticed is the existence of the officers' water-closets in the same compartment. The sick-bay is provided with a locker for the secur-

ing of liquors, poisons, etc., under lock and key, bath-tubs, water-closets, iron swinging-cots, and most of the appliances necessary for the comfort and treatment of the sick. The dispensary is situated immediately underneath the bay, on the deck below, and communicates with it by a hatchway. There was room for improvement in its arrangement.

During an engagement, ample space would be set apart in the compartments below the water-line for the reception and immediate treatment of the wounded; artificial light would be required. An ordinary cot slung on a pole, with a block and tackle attached, is used for removing the disabled from one deck to another.

The ship had been in commission about four years, and employed in the "Channel Squadron." During the past year there had been an average of two admissions daily to her sick-list, and an average daily sick-list of 16, or about  $2\frac{1}{2}$  per 100 of the ship's company. Venereal diseases formed a large percentage of the admissions. A number of boys and other recruits had been received on board during the year; they had added to the number of the sick.

*Climatology.*—As stated in previous reports, no meteorological instruments are in charge of the medical department of this vessel. An attempt was made to make an abstract from the record in the ship's log, but was abandoned on account of the incorrectness of the data.

*Medical topography.*—The following places were visited by this vessel during the past year in the order mentioned, viz: Ville Franche, Genoa, Ville Franche, Spezia, Ville Franche, Gibraltar, Lisbon, Cherbourg, Hamburg, Christiania, Copenhagen, Deal, Southampton, Lisbon, Gibraltar, Scutari, Oran, Algiers, Malta, Alexandria, Piræus, Malta, Messina, Naples, Ville Franche, Gibraltar, and Funchal. At only a few was information of professional interest obtained. Our stay at most of them

was too short to obtain many facts or to arrive at correct conclusions concerning them.

*The Hamburg State, Germany.*—The Hamburg State has a population of about 360,000; Hamburg City about 180,000, and its closely-connected suburb, St. Pauli, 60,000. The same sanitary regulations prevail throughout the state. They are considered very effective, though a modification is contemplated, in order to assimilate them to those in force in other parts of the German Empire. Hamburg is a healthy city, its streets are wide and well paved, its houses are mostly of modern construction, and it is well drained. It is intersected by several canals, through which the tides ebb and flow, and by a large fresh-water lake, on the banks of which many of the residences of the wealthy are situated. It has extensive gardens and commons interspersed with trees, where once the old city fortifications were located. The mean temperature of the air for the year 1874 was 50° Fah.; the hottest day was July 20—the thermometer registered 88°; the coldest was February 10—thermometer registering 18°. The mean temperature of the three winter months was 38°; of the three summer months, 64°. The greatest diurnal variation of temperature in winter was 18°; in the spring, 28°; in the summer, 38°, and in the autumn, 22°. The yearly rainfall was not ascertained; it must be considerable.

Hamburg has many educational and charitable institutions. Several of the latter, with their objects, are here enumerated.

The General Hospital is located about two miles from the centre of the city, in the midst of extensive grounds, some of which are used for the growing of vegetables and fruit for the establishment. It was erected in 1823, and has from time to time since then been enlarged and improved. It now consists of a collection of large brick buildings, some of them of modern construction, and six smaller wooden structures recently erected.

styled barracks or pavilions, all of them possessing advanced methods of ventilation. One of the brick buildings is separated from the others by a street, and is used for small-pox patients. The hospital has generally about 1,600 patients, and an annual mortality of 500. It can accommodate 2,000 patients, and allow 1,000 cubic feet of air-space to each. It has 445 rooms, 240 attendants, a resident director, and 8 resident medical men. The salaries of the latter vary from \$300 to \$3,000 per annum. Patients who pay \$2.20 per diem are provided with a private room, nurse, and special medical attendant, as well as necessary food and medicine. Those paying \$1.50 per diem may occupy the same room with another, and share the services of a nurse between them. A third class pay 75 cents per diem; they occupy wards with 3 or 4 other patients, and are supposed to receive more comforts and attention than those who pay 30 cents per diem, and the paupers, who occupy usually the largest wards. Prostitutes with venereal disease are required to pay 40 cents per diem. About 100 of them are admitted monthly. Two hundred insane patients are treated in this hospital, owing to the crowded state of the asylum. No doubt much interesting and valuable information might be obtained at this large institution, but no professional courtesy was extended. A senior physician was called upon, who, with frigid politeness, instructed a non-professional attendant to exhibit part of the establishment.

The Lunatic Asylum is beautifully located in the adjacent suburb of Fredericksberg; it has about 600 inmates, and is in charge of a senior physician of the General Hospital.

There is also an association for the aid and cure of those who may be temporarily insane.

The Jewish Hospital of St. Pauli is for the free treatment of poor sick Jews; and, when not full, sick Gentiles may be received upon payment.

The Catholic Hospital admits the sick of all denominations on payment of from 40 cents to \$1.25 per diem. Cases of syphilis, small-pox, and itch are not admitted. Its nurses are Sisters of Charity.

The Free Masons' Institute admits the sick of that order, except cases of small-pox and lunatics.

The Hedwig fund, of about \$66,000, founded by Dr. Ludwig von Hess and his wife as a token of regard for their sister, provides medical attendance and aid for women and girls with disease of the eye. Two thousand four hundred dollars of the interest is annually divided into 200 parts, and given to the patients; the remainder of the unexpended interest is being accumulated so as to build an asylum for at least 12 women.

St. George Hospital and Sick-House, established in the thirteenth century, for the care of 41 widows and young women. It now receives 140 helpless aged people, provides them with lodgings, medical attendance, privilege of the kitchen, and 75 cents each, weekly.

There is also a Children's Hospital in the suburb of St. George; it is in charge of Sisters of Charity.

The Jewish Association for Cripples is for the aid or support of crippled Jews.

A Women's Sick Association for the care of respectable servant-girls when sick. It admits as members girls between sixteen and forty-five years of age; also childless widows.

The Orphans' Home has 600 inmates. Farming out is adopted with the youngest. Boys are kept at the home until fourteen years of age, girls until sixteen. They are educated and taught various trades. On leaving they are provided with employment, which is easily obtained, as they are considered desirable servants and apprentices. They are allowed to visit their friends in the city once annually, on "orphans' day," about May 1, for the purpose of receiving money, clothing, &c. The money is put in a common fund.

There are also a Catholic and a Jewish orphan asylum.

The Alsterdorfer Institutes provide for 170 unprotected children on payment of about \$37 per annum for each, also for imbecile and idiotic children at \$75 per annum each, and for adult imbeciles and epileptics at a higher charge; also a "pensionnat" for the more wealthy class of imbecile children at \$300 per annum each, and a children's home for young convalescents and children suffering with chronic diseases. The buildings are located in one of the suburbs of Hamburg. They have about two acres of garden-land attached, in the cultivation of which the inmates are frequently employed.

An institute and school where 60 healthy deaf and dumb children are cared for, educated, and taught trades. Required fee, \$233 per annum.

Waiting-schools, seven in number, where children under six years of age are left from 8 o'clock a. m. until 7 p. m.; in one, from 5 a. m. to 8 p. m. The children must be able to walk and talk, and must take with them bread for their breakfast and supper. Dinner and drink are provided for them. They are cared for and instructed in elementary branches. From 6 to 8 cents a week are charged for one child and from 10 to 12 cents for two, of the same family. Some of these schools have been in operation forty-seven years. Over 1,500 children have attended them; during 1874 there were about 1,200 in attendance.

The work and poor house has 1,100 inmates; 70 boys and 30 girls are raised and educated in it. Those of the inmates who can work are employed at various trades.

The Paulsen fund provides for the care of about 500 children of the poor from 9 o'clock a. m. to 6 p. m., on payment of 7 cents each weekly, educating them and furnishing them with food and books. The school-rooms are heated by steam-pipes and are well ventilated; they are each in charge of a kindergarten teacher and assistants.

The Restalozzi fund provides for the care and education of 100 children.

The house of correction for children. Two-thirds of the inmates are boys and one-third girls; occasionally some of them are members of wealthy families. Connected with it is an educational society for missionaries; it numbers about 40 members, each of whom must have a trade.

The Pauline fund supports and educates 25 Jewish orphan girls, from seven to seventeen years of age.

The Martha fund provides education in housekeeping for honest girls, and obtains situations for them; it supports helpless aged women, and provides a home for respectable aged female servants, and a temporary home for girls out of employment.

A Magdalene fund, established in 1822, supports an asylum for reformed prostitutes, in which they are educated, taught housework, etc.

St. Hiobs Hospital provides lodgings and a little money for 100 poor women.

The Heine Asylum has a fund of \$120,000; it was founded by a daughter in memory of her parents; it provides 45 free lodgings for widows and spinsters over 50 years of age. It is non-sectarian.

The Bade Institute, established in 1834, provides 32 lodgings, 16 of them free, the rest at about \$20 per annum, for widows, particularly those of goldsmiths and house-builders.

The Jewish Widows' Society gives 45 widows about 40 cents each, weekly.

The Jewish Lying-in Society, established in 1814, provides any poor Jewish lying-in woman with two shirts, two bed-covers, clothing and washing for her child, 14 days' nursing, and \$14 in money.

The Hamburg Lying-in Hospital receives women during the

last month of pregnancy and provides for them during delivery and for 14 days afterward. Nurses are instructed in it.

A Cloister fund, established in the twelfth century, for the support of 11 young women belonging to Hamburg families. They have two rooms each, a common parlour, kitchen, laundry, and garden.

The Hamburg Woman's Association for the assistance of soldiers' families, the clothing and educating of their daughters, and the providing of employment for them.

A women's society for the care of the poor, principally girls.

A society to provide cheap lodgings for unemployed servant girls.

An association to provide young Jewesses with clothing.

A society for females, to assist fallen women to reform, giving them a temporary home, to aid women who have been in jail, and to protect young girls.

A blind asylum for the care of helpless blind girls.

A blind institute for the education of the blind of both sexes. Non-sectarian.

Hospital of the Holy Ghost, for the care of 170 aged persons of both sexes.

Society for aiding the poor, established in 1788, capital \$250,000; it also receives funds from the city; connected with it is the common poor-house. It is the most extensive and useful of the many charities in Hamburg. In 1870 and 1871, during the Franco-German war, nearly 27,000 sick persons were aided by it; over \$43,000 were expended on them. It has established five soup-kitchens in the city; it furnishes tickets for them, also sells them at about 2 cents each to the benevolent for distribution. It gives money, clothing, fuel, and bedding, employs medical attendance and obtains employment for the poor, dresses their children for school, aids the blind, idiots, and mutes, and provides a home, food, and clothing for aged people,



furnishes work for those of them who can work, hires the old men to contractors for sweeping the streets, etc., requiring for their services 10 cents daily for each man.

The Poor Institute of St. Pauli employs 5 physicians and 2 surgeons to attend upon the poor sick.

There are two people's kitchens, where a bowl of good soup and a plate of meat and vegetables are furnished for 8 cents. Separate rooms for men and women.

The Bethesda Society supports three sick-houses, where poor sick are received and treated; it also furnishes nurses.

Guest and poor house in St. George, established in 1248, for the support and care of respectable persons of both sexes over sixty years of age, on payment of a small sum.

God's lodgings, in Hamm, consist of tenements for 20 aged people, who pay about \$10 a year each. Two rooms are heated and lighted for them to work in.

Hamburg and Kaiser William fund, to aid wounded soldiers and families. Also several other soldiers' associations.

A society to aid shipwrecked people, now united with a similar society in Bremen. It has stations at Duhnen and Cuxhaven, on the Elbe. A reward of a Louis d'or is offered by it to any one saving a person from drowning.

An institute for saving drowning and smothering people, established in 1768; it has several stations with necessary apparatus.

Seaman's fund, to aid poor seamen who have sailed in Hamburg ships, also their families.

Seaman's Home, established in 1863, is beautifully located on a bank of the Elbe, in the midst of a garden and shrubbery. In it aged seamen are provided with a free home, and unemployed seamen with a temporary one, on payment of about \$3 weekly. Nearly 1,500 seamen staid in it during 1874. Attached

to it are a bowling-alley, billiard-room, music-room, reading-room, and well-stocked library.

German Seaman's School, for the instruction of boys between thirteen and fifteen years of age, desiring to be sailors. They are taught for two years to rig and build ships, seamanship, navigation, &c.

Anatomical Institute. In it lectures are given before students of the navigation school, on venereal diseases, popular anatomy, the ordinary treatment of diseases and accidents, dressing of wounds, and the method of treatment to be adopted by ship-captains at sea. The institute is supported chiefly by ship-owners, and is under the direction of the Hamburg Medical Association.

The anatomy building of St. George has dissecting, operating, and lecture rooms; in it medical students, nurses, and barbers' assistants are instructed; during the summer, lectures are given on physiology, and in winter on anatomy. The corpses of paupers are used.

Institute of Pharmacy, for the education of apothecaries.

Agency for nurses, for supplying nurses and attendants for the sick.

Several associations for the aid of poor students in completing their education.

An association to give information for the prevention of accidents by steam-boilers. It has a fund for the assistance of its members when injured.

An association to aid ex-convicts in reforming, in procuring employment, and in emigrating.

An association for the protection of animals. It furnishes medical aid to poor owners, buys worn-out animals, and when they cannot be recuperated, has them killed.

Several associations for the preparing for burial and the burying of the dead.

Numerous aid associations in which the Jews are conspicuous.

Several funds for aiding the poor in paying rent, procuring fuel, potatoes, &c., for them, furnishing free lodgings for the homeless, cheap lodgings, &c. Also many mutual-aid societies among nearly all the trades and professions.

From this lengthy but incomplete enumeration an idea can be formed of the vastness and practical nature of the charities of Hamburg.

The nature of the organization and the functions of the sanitary service of the Hamburg State were not ascertained except so far as they apply to prostitution.

Considerable difficulty was experienced in obtaining reliable information of any of the public institutions. An order or introduction from some of the Berlin authorities would have probably obviated it.

Prostitution is tolerated in the Hamburg State and is under the control of the sanitary service and police authorities. Certain laws are in force for the regulation of this vice; a copy of them was kindly furnished by Dr. Kraus, of the "Medicinal-Bureau" of Hamburg. A translation of this is appended to this report.

Women detected in the act of prostitution are arrested and punished by the police authorities, if not registered as prostitutes.

In the year 1874, there were about 200 brothels in Hamburg, about 20 in St. Pauli, the former containing about 1,000 and the latter 75 registered prostitutes. Among them about 700 cases of venereal disease were detected and received hospital treatment. As about 1,200 cases among women were treated in the general hospital during the year, the inference is that non-registered women made up the difference.

*Births.*—During 1874 in the Hamburg State there were 14,732 children born, being the very large proportion of nearly 41

births to every 1,000 of the inhabitants; and calculating from the statistics of the three previous years it was supposed that 11,000 of them would live to be one year old; 10 per cent. of the children were illegitimate;  $4\frac{1}{4}$  per cent. were still-born. The greatest number of births in one month, 1,310, was in September, the smallest, 1,069, in February; 7,594 were boys and 7,138 girls, or 106.3 boys to every 100 girls; 14,070 were born at full time, and 662 prematurely. The presentations were 13,771 natural or of the head, 70 of the face, 506 of the breech, 127 cross, the rest not stated. In 676 cases operative assistance was given; of them 155 dead children were born. Among the operations were five of craniotomy and one of Cæsarian section. Fourteen thousand five hundred and forty women were confined, and of them 93 died.

*Deaths.*—In the Hamburg State during 1874, 9,661 persons died, being about 27 in every 1,000 of the inhabitants. Owing to certain cases being introduced that might fairly be left out, 25 per 1,000 would more correctly represent the rate of mortality.

As before mentioned, Hamburg is a healthy city. It has a large proportion of long-lived citizens. Among them in 1874 were 3,557 between the ages of fifty and seventy years, and 2,806 over seventy years of age. In Berlin, with three times the population, there were at the same time 2,691 of the former and 1,492 of the latter.

Of the mortality for 1874, 34.6 per cent. was among children under one year of age, being 23.7 per cent. of the living children born. This great mortality is chiefly accounted for as follows, viz: There were 730 deaths from atrophy, 686 from inanition, 666 from diarrhoea and cholera morbus, 421 from cramp, 321 from pulmonary inflammation, 155 from acute infectious diseases, 118 from cerebral affections, 85 from cough, 35 from croup, 30 from measles, and 30 from syphilis. In 1874 there were 38 cases of variola—15 in persons unvaccinated, 23 in the

vaccinated. There were two deaths among the former and none among the latter.

During the same year there were 1,286 cases of scarlatina and 70 deaths from it, being 5.44 per cent. of the cases; of measles there were 2,964 cases and 137 deaths, or 4.62 per cent. of those attacked; of whooping-cough, 1,175 cases and 179 deaths, or 15 $\frac{1}{4}$  per cent. of the attacked; of sporadic cholera, 1,703 cases and 9 deaths; of typhoid fever, 1,128 cases, being 32 in every 1,000 of the inhabitants, and an increase of nearly 200 on the previous year, accounted for by an épidémie occurring in a suburb where the houses were constructed on newly-made land; the drainage was imperfect and the drinking-water bad; on the latter two being remedied the disease subsided. The deaths amounted to 193, or 17 per cent. of those attacked. Of croup and diphtheria, 1,822 cases and 362 deaths; of dysentery, 9 deaths; of puerperal fever, 61 deaths; of syphilis, 34 deaths; of rachitis, 56 deaths; of diabetes, 3 deaths; of dropsy, 92 deaths; of phthisis pulmonalis, 1,208 deaths; of tubercular meningitis, 310 deaths; of cancer, 319 deaths; of acute articular rheumatism, 193 deaths; of inflammation of the brain, 296 deaths; of delirium tremens, 43 deaths; of apoplexy, 366 deaths; of inflammation of the heart and aorta, 254 deaths; of gangrene and old age, 490 deaths; of hernia, 15 deaths; of catarrh and influenza, 71 deaths; of acute pulmonary inflammation, 832 deaths; of chronic pulmonary inflammation, 267 deaths; of gastritis, 193 deaths; of enteritis and peritonitis, 72 deaths; of affections of the urinary organs, 168 deaths; sudden deaths from unknown causes, 226; deaths from accidents, 196; suicides, 89.

The number of suicides in other years than 1874 was not ascertained; that given is at the rate of 1 suicide for every 4,045 of the inhabitants; it is nearly equal to the very high rate reached in Ireland in 1861, which was 1 for every 3,861 of

the people. The suicidal rate in London, England, for many years past has not averaged over 1 for every 9,500 of the inhabitants.

The large comparative proportion of deaths from tubercular and pulmonary diseases will also be observed. It is believed if statistics were obtained they would show a large proportion of persons suffering from mental diseases.

The foregoing information concerning the Hamburg State has been obtained partly from observation and partly from reports and returns of different societies and the state authorities, for assistance in the translation of which, I am indebted to Master Karl Rohrer, United States Navy, and commanding-officer's clerk, Mr. Pohl, of this vessel.

*Norway.*—The vessel called at Christiania in July last and remained there five days. Through the kindness of our hospitable consul, Mr. Gade, I had the pleasure of meeting Professor Boeck, the celebrated syphilographer; Dr. Nicolaysen, professor of surgery at the Christiania University; and Dr. Bidentkap, state physician, chairman and chief physician of the sanitary service. To all of these gentlemen I am indebted for kind attention and much valuable and interesting information. Every facility was extended by them for obtaining information in their respective departments, which the shortness of our stay prevented taking much advantage of.

The sanitary service of Norway may be said to date from 1860, when a law was enacted establishing sanitary commissions and for the prevention and suppression of epidemic and contagious diseases throughout the kingdom. The entire country was divided into 137 civil districts, and each district provided by the government with a medical practitioner. In 1872 there were 434 authorized physicians in the country. Sanitary commissions are appointed for every town and parish or association of country districts. Those of the parishes are composed of members of

the district councils, with a district doctor or other medical practitioner as chairman. They are less effective than those of the towns, on account of the infrequency of their meetings from the difficulty in assembling the members from their widely-separated residences. Their chairmen are usually intrusted with unlimited power and are chiefly depended on for the execution of the duties of the commissions.

In towns, the sanitary commissions are composed of six members, one of whom, the chairman, is always a medical practitioner; the others are a magistrate, a city engineer, and three persons elected on account of fitness by the town or city council. In Christiania alone, the chairmanship is a permanent government appointment. The powers of these commissions vary in different sections of the country. When their actions require legislation they are referred to their respective local civil councils, by whom their feasibility, &c., are discussed, and if approved, referred to the general government, in order to receive the force of law. Hence each town and parish has its special sanitary laws.

The councils are required to pay the expenses of their respective commissions. A fund is usually at the command of the latter to enable them to provide for any immediate necessity. Their management is generally characterized by economy and the strictest integrity.

The sanitary service of Christiania is considered very effective; its powers are of the most extensive character; they may be said to embrace everything affecting the public health. Any building can be appropriated for hospital purposes, and any sick person, when necessary, compelled to enter a hospital. Every medical practitioner is required to report daily to the chairman of the board the nature and number of cases of each disease he is called upon to treat. Every keeper of a boarding-house or hotel is obliged to call in a doctor whenever a suspicious case

of sickness occurs on their premises. It provides for the quarantine service and public vaccination. The law affecting the latter renders it indirectly compulsory. No child can enter a school, nor can any person be confirmed or married unless vaccinated. Revaccination is voluntary, but the people are generally instructed to believe in its efficacy. Variola has often been introduced into Christiania during the past eight years, but has always been prevented from spreading.

The medical staff of this city sanitary service consists of a chief physician, who is chairman of the board; he exercises supervision over all the hospitals except the royal hospital; over all the city institutions for the care of the sick and poor, and over all persons whose duties relate to the sanitary condition of the city and people; a police physician and assistant, who inspect the prisons, attend sick persons temporarily imprisoned, and examine prostitutes; four district physicians, who attend the poor and oversee the hygienic arrangements of their districts. There are also four inspectors of nuisances, and a number of clerks.

There are no coroners' inquests or trials by jury in Norway. When a person dies in Christiania, a physician's certificate of the cause of death must be presented to the sanitary board before interment is permitted. When suspicious circumstances exist concerning a death, they are investigated by the police authorities. In country districts the dead may be buried without a certificate.

There is very little quackery in medicine throughout the kingdom. Patent medicines are but little patronized. A law was formerly in force whereby persons not regularly educated physicians were severely punished on being detected treating the sick; it is now modified so as to punish them only when they can be proved to have done positive harm.

The population of Norway at the commencement of the year



1872 was 1,756,965, and the deaths during that year amounted to 29,417, which, after excluding 2,014 dead-born, shows a mortality rate of 16.79 per 1,000 of the inhabitants for the year. The highest rate, 24.59 per 1,000, was in the town of Bergen, probably due to the number of lepers residing there; the next highest rate was in Christiania, and in the district farthest north; the lowest was in the midland districts; in some of them it has not amounted to over 14 per 1,000 annually for several years.

The principal causes of death throughout the kingdom during the year 1872 were as follows, viz: From phthisis pulmonalis there were 1,778 deaths; scarlatina, 965; pneumonia, 872; decrepitude, 652; cerebral meningitis, 616; cancer, 477; typhoid fever, 417; dropsy and Bright's disease, 409; diarrhoea, 398; bronchitis acuta, 373; pertussis, 355; apoplexia cerebri, 335; bronchitis chronica, 280; convulsiones infantum, 257; hydrops, 232; debilitas congenita, 179; peritonitis, 164; febris puerperalis, 129; cholera communis, 127; elephantiasis græcorum, 120; gastritis chronica, 113; gastro-enteritis, 112; atrophia infantum, 102; diphtheria, 76; gangræna, 64; erysipelas, 35; accidents, chiefly drowning, 1,140. The deaths from cancer were at the rate of 1 in every 3,706 of the inhabitants, the same number of deaths from this disease occurred the year previously; 223 of those who died were men, and 244 women; and 417 of the deaths during 1872 were of persons between the ages of forty and eighty years; of 406 of the cases the stomach was the part chiefly affected in 211, the mammæ in 41, and the womb in 34.

Elephantiasis græcorum, lepra borealis, prevails chiefly among the people living in the northwestern districts of Norway—that portion lying a few miles from the coast, between the heads of the fiords and the mountains, and extending from Bergen northward. A few cases exist in other parts of the country, only three or four in Christiania; they can generally be traced to

the first-mentioned districts. There are about 2,000 lepers in the country; during the past ten years their number has slightly diminished. In 1872 there were 205 deaths among them, though in 102 only was death caused by leprosy.

In Bergen there are three leper hospitals; two of them are for incurables, and in one an attempt is made at treatment. One or two cases are reported annually as cured. During the past fifty years about 30 cases have been cured. The disease is not inoculable, nor is it considered contagious. Dr. Bidentkap mentioned the case of a wife being afflicted with it for twenty years and her husband remaining free. It is believed that the tendency to the disease is nearly always inherited, and that its outbreak can often be prevented by improving the hygienic and social conditions of the suspected, particularly if commenced during childhood.

The city of Christiania has a population of about 75,000. Its temperature ranges from 8° Fah. during January and February to 85° during July and August. The mean temperature for the past thirty years has been, for January 23°, for July 61°·7 Fah. The annual rainfall is about 26 inches.

The annual death-rate in the city during the past ten years has varied from 17 to 23 per 1,000 of the inhabitants; for the first six months of 1875 it was 22·48 per 1,000. The causes of death differ but little from those acting throughout the kingdom.

Typhus fever is nearly stamped out; the few cases that have occurred during several years past have all been imported.

Typhoid fever has prevailed every second year for ten years as a small epidemic; in 1874 there were 43 cases of it in the city.

Scarlatina and measles have been moderately prevalent; cases of them are not usually sent to hospital, but the families in which they occur are placed under slight restrictions and the children are not allowed to attend school.

Erysipelas has been quite prevalent during the past three years, and puerperal fever for two years; 16 cases of the latter occurred during the first half of 1875. Most cases of child-birth are attended by trained midwives or nurses, who, while attending a case of fever, are forbidden to wait upon healthy women. In 1872 there were 607 authorized midwives throughout the kingdom. Their course of training extends through one or two years; they are examined and receive about \$50 per annum when employed by the district or sanitary authorities, besides customary fees from wealthy patients.

Diphtheria is rare in Christiania. Pertussis is very common. Pneumonia is also of frequent occurrence; a form of it is suspected of being contagious; it is acute and rapidly fatal.

Cholera Asiatica prevailed epidemically in 1866; there were 60 deaths from it during that year. In 1870 and 1871 a few cases were imported, but were confined to the quarantine station. Stringent regulations exist against the importation of this disease both by land and sea. During its prevalence in Europe the railway officials and other public carriers in Norway are directed to notify the nearest sanitary authorities, by telegraph if necessary, when any passenger is suspected of having the disease, in order that proper quarantine measures may be adopted.

Prostitution in Christiania is not recognized by law except as a vice; it is tolerated. By the application of the laws relating to disorderly characters and also of those for the prevention and suppression of contagious diseases, through the energetic action of the sanitary board, particularly of its distinguished chairman, this vice and its consequences are probably held under better control than in any other city in Europe. To enforce the laws the police give their assistance; about eight superior men are employed as special police or detectives.

Prostitutes are divided into three classes for the convenience

of the sanitary board and the police. The first class comprises those who live together in numbers in brothels; they are examined twice weekly. The second class embraces those who live alone, privately; they are examined once or twice weekly. To the third class belong those who are regarded as occasional prostitutes; they generally have legitimate means of living; they are examined occasionally.

During 1874 there were 3,760 examinations of those of the first class, and 53 cases of syphilis primitiva, 19 of syphilis consecutiva, and 52 of blennorrhagia were detected; of those of the second class there were 781 examinations, and 20 cases of syphilis primitiva, 5 of syphilis consecutiva, and 43 of blennorrhagia detected; of the third class there were 277 different women examined; 915 examinations detected among them 68 cases of syphilis primitiva, 21 of syphilis consecutiva, and 58 of blennorrhagia. The diseased women as soon as detected are sent to a Lock Hospital, except an occasional one of the third class, where such a course would be ruinous socially. A kind discrimination is exhibited in favor of private treatment if the assurance is undoubted of no further spread of the disease.

A register is kept by the sanitary authorities of the names of all prostitutes, their residences, family histories, positions in life, and dates of medical visits, with their results.

There are no laws enforcing the examination of suspected or public women other than those already alluded to. When a woman is suspected of leading a dishonorable life the facts are reported to the sanitary board, and if sufficiently conclusive, she is notified by the police to appear before the examining physician. Should she refuse she can be sent to the workhouse on proof being exhibited before the police authorities of her disorderly character, and when there she can be compelled to be examined on suspicion of having a contagious disease. If con-

taminated, she is registered as a prostitute, and treated accordingly.

When the chief sanitary physician ascertains from the daily reports of the several medical practitioners that there is an increase in the number of cases of venereal disease, he instructs his subordinates to be more thorough in the examination of suspected sources.

The foregoing system has been in operation about forty years, and during that time venereal diseases have sensibly diminished in frequency. A high authority remarked that if a similar system were in force in England syphilis would soon be exterminated in Europe. If America were embraced in his plan the result might be more nearly attained.

There are six hospitals in Christiania and its suburbs, viz, the Royal, containing about 300 beds; the Common, about 250 beds; the Quarantine Hospital, seldom occupied, situation delightful, accommodation unlimited; and two hospitals for the insane, they have about 400 inmates.

The Royal Hospital only was visited. It is not under the control of the city authorities; the medical faculty of the University of Christiania has the chief voice in its management. In it the medical students receive the major part of their clinical instruction. Its buildings are old and not well adapted for hospital purposes. New ones are being erected on the pavilion plan; they are to embrace the most recent and desirable improvements and will require about four years for their completion. It has six services, two medical, two surgical, one cutaneous and syphilitic, and one lying-in. The charges for patients, except the poor of Christiania, are \$1.25, 80 cents, and 50 cents per diem, according to accommodation. It has a resident director, who is provided with a house to live in and \$1,400 a year. The professional staff consists of six chief medical officers, professors at the University, one in charge of each service, five

senior and eleven junior assistants; a prosector and assistant—the former is also professor of pathological anatomy; an apothecary, who is also an instructor in practical pharmacy; his establishment is not located in the hospital buildings, but in their vicinity. He is a “royal apothecary,” and sells his wares to other customers besides the hospital.

In the surgical wards many “American ideas” were said to have been adopted. Professor Nicolaysen has charge of one of the surgical services; he was several months in Washington at the close of our late war, investigating on behalf of his government our Army medical system. A copy of his highly comprehensive report he kindly presented to me.

The service of venereal and cutaneous diseases is in charge of the venerable Professor Boeck. He honored Assistant Surgeon Rogers of this vessel and myself with a minute description and illustration of his method of treating syphilis, and exhibited to us most of his hospital patients, about 100, who were being subjected to it. It would be superfluous to describe the *modus operandi* of the treatment of syphilis by syphilization, particularly after the publication of Bumstead’s report on Professor Boeck’s treatment of two cases in New York during his recent visit to the United States. The professor states that those two cases and their limited time of treatment were not sufficient to enable any one to form a correct estimate of the value of the method. He claims for syphilization that it is applicable in nearly every case of syphilis, and that the chances of future manifestation of the disease are more diminished by that method of treatment than by any other; that the diminution is decided, the number of cases of relapse being very few, seldom occurring where syphilization has been the only treatment adopted and where it was resorted to on the first appearance of constitutional symptoms. This he believes to be proved in the “tables of statistics, taken from the archives of the hospitals of Chris-

tiania," appended to his recently published "Researches upon Syphilis," a copy of which I was favored with, but have not yet been able fully to peruse. It is a history of cases of syphilis treated in Christiania during the past fifty years by various methods, including syphilization. So far as a single visit to this interesting service would indicate, the professor seemed to have good reasons for his faith. His patients were of every age from the nursing infant to the sexagenarian, and every stage of syphilis was represented by them; all were being treated by syphilization, and all except two appeared to be progressing favorably; the exceptions were an old case of lupus and a case complicated with erysipelas, of whom it was whispered that the complication was due to impure inoculation. None of the patients were anæmic or depressed in appearance, and to none had tonics been administered nor other than ordinary hospital diet. Syphilization was never commenced until after the appearance of secondary symptoms; occasionally when it appeared to act unfavorably or to be inert, mercurials or potassii iodidum would for a time be resorted to and afterwards inoculation carried to the complete cure. Treatment generally extended over four months when commenced with the early symptoms of the disease; a longer period was often required when the disease was of long standing.

The professor appeared very desirous to prove to us the efficacy of the method; he invited me and any of my friends to send him at any time the worst and most intractable case of syphilis we could find for treatment, and he would all but guarantee a cure. He also remarked that syphilization was approved by the patients and people of Norway, generally, who knew aught of it; that on his return from America, after he had resigned his position in the hospital and University, he had been invited to resume charge of the syphilitic and cutaneous department, when his length of service entitled him to rest,

showing the confidence of the people in the system he advocated and practiced.

Christiania is the seat of a University, the only one in Norway. In it instruction is free. To obtain the degree of Doctor of Medicine from it, a course of from six to seven years' study is required. Medical students are required to spend about two years in the arts department, and pass two examinations preparatory to commencing the study of medicine. The first two and a half or three years are devoted to the study of practical and theoretical anatomy, theory and practice of chemistry, zoology, comparative anatomy, and botany, in which they are examined; then a similar period is devoted to attendance at the hospital and the study of physiology, therapeutics, materia medica, pathology, toxicology, ophthalmic surgery, practice of medicine, and pathological anatomy; after passing a satisfactory examination in those branches, a further six months' or year's study and attendance in the Common and Lying-in-hospitals is required; at the expiration of which, they are examined in midwifery, gynecology, diseases of children, operative surgery, medical jurisprudence, hygiene, topographical anatomy, and are required to clinically examine a surgical and medical case and write two satisfactory theses. After graduation they are appointed assistants in the hospitals, where they may remain one and a half years, and then, as my informant remarked, it is not necessary for them to go abroad to acquire a knowledge of their profession.

*Denmark.*—Copenhagen was visited by this vessel in July last. The city has a population of about 190,000. It is healthily located, has wide and clean streets, houses built chiefly of brick and stone, has a good water-supply from an adjacent lake, and has good drainage. There are no diseases peculiar to the place. The annual mortality of recent years has been at the rate of



about 28 per 1,000 inhabitants, but time did not permit the obtaining of exact data.

The sanitary system is very similar to that of Christiania. The city is divided into 24 sanitary districts; each district is provided with a medical officer, whose duty is to visit the sick poor, send them to hospital when necessary, certify to the cause of death, investigate the sanitary condition of the district and its people, and report to the sanitary council. The latter in conjunction with the police authorities take such action as may be necessary.

Vaccination is obligatory; it must be performed before the ninth year of age, unless variola is in the neighbourhood, then all persons who have not already been, are vaccinated at once. Revaccination is voluntary and is not often performed; on that account variola is seldom absent.

Prostitution is tolerated, and is kept under surveillance and control by enforcing the regulations for the punishing of disorderly persons and for the extinction of contagious diseases. Any woman reported by the police as being guilty of frequent irregularities, and without other means of support, will be registered as a prostitute, ordered to be examined twice weekly, and furnished with a white card, on which will be recorded her name, date of medical visits, etc. Women, when first detected by the police in occasional irregularity, will be cautioned, their status ascertained and privately registered; they will be examined when considered necessary, and furnished with a green card with the date and report of examination inscribed upon it.

The examinations are made free of charge, by medical officers appointed by the sanitary council, in convenient places selected for the purpose; but a prostitute can be examined at her residence, either by the usual examiner or any other qualified medical practitioner, on payment of the required fee. When found diseased, even if the disease is only of a suspicious nature, the

woman will be at once sent to the Lock Hospital and there confined until pronounced well.

The Lock Hospital is a branch of the Common Hospital of Copenhagen. It is temporarily located in an old building attached to the "Home for Aged Persons," until a more commodious structure is completed. Its service, together with that of cutaneous parasitic diseases, treated in an adjacent building, is in charge of Dr. R. Bergh, to whose kindness I am indebted for a report on the operations of the hospital during the past year, and a very interesting history of a case of scabies crustosa treated by him.

None but prostitutes are admitted for treatment in the Lock Hospital. It averages about 200 inmates. No payment is required of them; they are not allowed to leave the building until cured; they can be visited by their friends during certain hours weekly; reception-rooms are set apart for the purpose.

Two varieties of venereal ulcer are recognized by Dr. Bergh; the soft chancre he treated entirely locally, and had noticed that of late years it had diminished much in frequency of occurrence; the hard chancre he treated locally until consecutive symptoms appeared. Iodoform was much used in the treatment of both forms. The early consecutive syphilitic symptoms he treated by hypodermic injections of a solution of corrosive sublimate, or by inunctions of mercurial ointment. In the later symptoms, tonics, potassii iodidum, and local treatment were relied upon. No accidents had ever been observed in this service from subcutaneous injections. The sublimate was usually introduced deeply into the nates and dispersed by manipulation. In gonorrhoeal affections astringent injections were chiefly relied upon.

The Common Hospital of Copenhagen is an extensive modern establishment, built of white and red brick, and of quite an ornamental appearance. It is located on slightly elevated land,

in a healthy suburb of the city, in the midst of spacious grounds, and facing a beautiful botanical garden. It was constructed for its present purpose and has been occupied about ten years. It consists of a main building two stories in height, and of several wings and detached buildings or pavilions. The central part of the main building is used for reception-rooms, attending physicians' offices, and quarters for the resident medical officers. The male patients occupy one end of the building with its adjoining wings, and the females occupy the other end. One of the detached buildings is occupied by 100 insane patients. Another is reserved for small-pox patients. Some of the smaller buildings or pavilions are used for cases of contagious fevers, dysentery, severe surgical cases, etc. The kitchen, laundry, clothes-rooms, store-rooms, engine-room, *post-mortem* room, dead-house, etc., are all in detached buildings. The bath-rooms are in buildings adjoining the male and female departments, and have convenient means attached for conveying patients to them; they are perfect in their appointments, possessing every necessary appliance for hydropathic treatment; separate rooms are set apart for venereal cases, and several waiting ones are attached where patients can be placed in bed when their necessities require it.

The kitchen and laundry are furnished with the most approved labor-saving machines. A plan of cooking by placing partially boiled meat in air-tight vessels inclosed in a packing of hay was found to answer admirably; it was claimed to be a better and more economical method than the ordinary one for making soup, boiling meat, etc.

The hospital has 100 large wards and a number of small ones, the latter chiefly for private patients; the former contain from 5 to 20 beds in each. The rooms are high, well lighted by large windows, heated by stoves, and ventilated by means of pipes or tubes placed in the walls and floors that con-

vey fresh air to apertures under each bed and to the spaces that are inclosed by a casing which envelops the stove, so that by means of the latter the air may be heated before entering the room. The foul air is drawn through openings, or registers, near the ceilings along tubes into a tall chimney, where it is propelled into the open air. It is accomplished by means of an aspirator or fan located in the engine-room near the chimney and driven by steam. Capacious, well ventilated and lighted corridors extend through the buildings; the stairways are of iron. The entire establishment has an air of neatness, cleanliness, simplicity, and usefulness seldom equalled in public institutions.

The services of the hospital consist of two medical, two surgical, one syphilitic and cutaneous, and one insane. A civil practitioner is in charge of each; he is generally a professor in the University and is paid from the college fund; he has an assistant and four sub-assistants, all of whom are graduates in medicine; they reside in the hospital and receive small salaries from the hospital fund; they usually serve two years. There are also about 200 other persons employed in the institution.

The sick poor of Copenhagen are admitted for treatment free of charge; other sick are required to pay from 40 cents to \$1.20 per diem, according to the quarters and attendance required. Eight hundred and fifty patients can be accommodated; 700 inmates is the general average, divided as follows: 200 in the medical wards, 200 in the surgical, 200 in the venereal and cutaneous, and 100 insane. Of the medical cases pulmonary affections form the majority. Of the venereal and cutaneous about 80 are syphilitic, 20 chancroidal, 35 gonorrhœal, and 65 various non-syphilitic cutaneous diseases. Lupus is common among the latter; as many as 20 cases have been treated in the hospital within two months; 14 cases have been in the wards at one time. No special cause was assigned. Leprosy is rare; only 4 cases have been known in Denmark during many years.

In the treatment of syphilis syphilization is ignored; early symptoms are treated locally and by mercurial inunctions. Hypodermic injections in this service were found to be often followed by abscesses and other accidents. Late syphilitic affections were treated with tonics and potassii iodidum, though cases of extensive ulceration, involving the deep tissues of the larynx and fauces, were being mercurialized.

No prostitutes are treated in this service; they are sent to the Lock Hospital. A regulation exists in Denmark which authorizes all persons, other than the class just referred to, affected with venereal disease, to be admitted in any hospital in the kingdom and to be treated free of charge. In case of gratuitous treatment they are obliged to remain in the institution until cured, while paying patients who desire to leave a hospital before a cure is effected are required to report from time to time before a medical man until they are well.

I am indebted to Professor Engelsted, the distinguished and courteous physician in charge of the venereal and cutaneous service, for many attentions, and much of the information obtained during too short a visit to this interesting hospital.

Besides the building already referred to for the insane, there is a large insane asylum in the city and two smaller ones in the kingdom. They contain in all about 1,600 lunatics.

Frederick's Hospital is a small institution located near the centre of Copenhagen. It is used chiefly for the reception and treatment of cases of accidents.

The Lying-in Hospital is located near the foregoing; in it about 500 births occur annually. It is closed during a part of each year for purposes of disinfection, cleaning, etc.

There are many other charitable and benevolent institutions in Copenhagen. Public begging is prohibited. The system adopted for aiding the poor is said to be the best in Europe.

Every Dane can read and write. Education of even the highest order can be obtained free of charge. Needy, meritorious students are often assisted from special funds during their collegiate career. The standard of medical education is about the same as at Christiania; at least six years are required to complete a course of medical study at the University.

Copenhagen abounds in museums, scientific collections, libraries, &c., all of which are accessible to students and scientists. The University of Copenhagen is the only one in Denmark. Previous to the severance of Holstein there was another belonging to the nation at Kiel; it now continues to flourish under German rule.

Since completing this report I have received from Dr. R. Bergh, of Copenhagen, a copy of a law in force in Denmark for the prevention of the propagation of venereal diseases in that kingdom, and our vice-consul at Copenhagen, Olof Hansen, esq., has very kindly favored me with a translation of it. It will be found, with a few corrections, appended hereunto.

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POLICE REGULATIONS FOR THE CONTROL OF PROSTITUTION  
IN THE HAMBURG STATE, GERMANY.

[A translation.]

1. GENERALLY.

1. The control of the police over prostitution relates not only to the prostitutes, but to all those who harbour them, and extends to illicit sexual intercourse generally.

2. The following regulations and the observance of them by interested persons, give those persons by no means a right for the continuance of the toleration which has hitherto been permitted. This tolerance can be withdrawn at any moment by the police authorities.

## 2. REGULATIONS FOR PROSTITUTES.

3. The entering in the register of controlled women takes place after a voluntary announcement by the woman herself, or by order of the chief of police in case of a woman being punished by sentence of a court for practicing prostitution, or where a woman is a noted prostitute.

4. The registration after voluntary announcement takes place only when it is found out that the applicant has been a prostitute for some time. Although age is not exactly decisive, women under age shall not, as a rule, be registered. When it is expected that parents, near relations, or guardians would object to such registration, they are to be heard and advised with.

A woman that calls voluntarily to be registered, must, before registration, be very carefully instructed and cautioned concerning the indecent and disgraceful life she is about to enter. For this reason she will be required to sign the following declaration:

"I, ———, hereby certify that before my being registered as a prostitute by the acting police officer, he has given me full information about the indecent and disgraceful life which I am to enter; that he has given me full knowledge of the surveillance of the police to which I will henceforth be subjected; that, notwithstanding, I take this step of my own free will and without any persuasion; that I have told the truth concerning my former history, and that I have not been brought to Hamburg by false promises."

5. Every registered woman is authorized to ask at any time for her discharge from the register; especially may she do so of the examining surgeon, who will immediately communicate with the chief officer of morality. The discharge will always be given when the petitioner will leave the Hamburg State, or upon satisfying the authorities that she has the best will to lead a moral life, and pointing out the possibility of obtaining a livelihood by

moral conduct. A temporary discharge can also be granted, in which case a sanitary guard will be kept for a certain time. (See clause 15.) By no means is the discharge to be refused should the petitioner be indebted to her housekeeper, but should she be found guilty of fraud, she will be punished by imprisonment.

6. After registration every prostitute will receive a book of examination, also a counting-book, to keep her account with her housekeeper, and one copy of these regulations. She will be held responsible for the safe-keeping of these books, and will be required to produce them at times.

7. Registered prostitutes can select their place of abode only after communication with the acting officer of morality. Those living alone must have a special permission from the owner of the house. Removal to another dwelling always requires special permission. Permission to take a dwelling never gives them a right to keep it, not even until the next term of moving. As soon as reasonable complaints are made, either by the police or private persons, concerning the usage of a house by prostitutes, they must immediately remove from the house, by order of the police authority.

8. Prostitutes must always remember that it is their duty to avoid public scandal on account of bad conduct; they must be decent and reserved.

Every transgression of the regulations immediately following will be severely punished, viz:

Their dwellings must be fitted out in such a manner as to avoid the violation of public decency, and particularly so as not to give cause for complaint in the neighbourhood.

The entrance-door must be kept closed. The windows facing the street must be made impervious to sight, either by means of ground glass or curtains. The lower part of the windows must be fastened in such a way that it will be difficult to open



them. Parlors on the ground floor, looking towards the street, must be kept dark during the evening.

A tariff must be affixed in a visible place in the parlour, in all rooms frequented by visitors, and in sleeping-rooms.

9. Prostitutes are strictly prohibited to keep with them a man or non-registered woman as boarders; to keep female servants under twenty-five years of age; to keep children, either their own or those of others, if of an age required for attendance at school, or any persons under age.

10. Prostitutes are strictly prohibited: 1. To allow any young man under twenty years of age to visit their rooms, or to have sexual intercourse with him. The transgression of this prohibition will be severely punished. 2. To undress out of their sleeping-rooms, especially in public rooms. 3. To expose themselves unnaturally. 4. To allow dancing-music, card-playing, or other games, except when music is allowed by the police; then, only until midnight. 5. To allow singing, noise-making, quarreling, fighting, or other misdemeanor to be caused by themselves or others; they must be forbidden at once, and should quietness not be restored, they must immediately call upon the police.

Prostitutes are not obliged to commit fornication with any man.

11. Prostitutes are prohibited as follows:

1st. *a.* Girls of the first class, to charge for one visit, not extending over half an hour, more than 75 cents, and for each succeeding hour 75 cents at most.

*b.* Girls of the second class to charge more than one-half of the above-mentioned rates.

*c.* To charge any one for staying in the public-room except for drink. This room must have a good visible sign as "Public-room," and a tariff must be posted in it in a prominent place.

2d. To charge more for drink than is allowed by the tariff.

3d. To cheat visitors by extortion, especially by exciting them with public scandal.

4th. To take a pawn of any description instead of money for payment.

5th. To give credit. Such a debt will be inadmissible before the law. Should visitors not be willing, or not be able to pay for what they obtain, they will be justified in having them arrested; any abuse of this privilege will be severely punished.

12. Prostitutes are prohibited: 1st. To appear publicly in low-cut dresses. 2d. To leave their dwellings in the afternoon between the hours of two and five, from March until September, inclusive, without special permission from the police authorities, or to promenade in the streets during the same hours in other months of the year, or in the evenings along the Exchange place or its environs, the Wall, the Alster or the harbour promenades. 3d. To be out of their houses after 11 p. m. without a male companion. 4th. To drive in open carriages. 5th. To visit public dancing saloons, or places of amusement, except those authorized by the police. 6th. To sit in the first or second places or the parquet of the city theatre, or in the first places, parquet or parquet-boxes of the Thalia theatre, or in the first places of other theatres and public exhibitions. 7th. To make themselves known to passers-by, by calling or knocking at the windows. 8th. To address men while on the street, to allure them by hints, or to otherwise molest them. 9th. To write letters to men who formerly visited them, or to molest them in any manner, should they break off their intercourse. 10th. To engage or make appointments with men in hotels or public places.

13. There is founded a meretricial fund, to save the state any expense incurred in controlling prostitution, and every prostitute is required to contribute to it. For this reason the following charges are made, viz: For registration, 75 cents; for registration after discharge from hospital, 30 cents; for permission

to remove into another house, 30 cents; for permission to change their own names, 75 cents. Prostitutes of the first class will pay monthly, \$2.40; those of the second class, \$1.80. For the first book of examination, 15 cents; for a book of regulations, 30 cents; a counting-book, 30 cents; and for this fund counting-book, 30 cents. Prostitutes having children may pay less. In some cases the payments may be entirely remitted. The monthly contributions can be increased or temporarily remitted, according to the state of the fund. It is a principle not to collect more money than is necessary for current expenses.

14. There is also established a travelling fund, to which every registered prostitute in the German empire has to contribute two cents weekly. This fund is to forward them to their respective homes, either by railway or steamship, and to pay their travelling expenses.

15. Prostitutes desiring to marry, or to lead a moral life by taking a servant's place, will be under a modified sanitary guard for six months, or until the marriage is consummated. If it is found that they continue to practice prostitution they will be punished and placed under full police control.

16. Any prostitute who is kept as the mistress of one man is exempt from sanitary examination and contributions to the meretricial fund. Foreign women will continue to contribute to the travelling fund.

When prostitutes are unwell by reason of menstruation or venereal disease, they will communicate the fact at once to the chief sanitary surgeon. If convicted of practising prostitution they will be punished.

### 3. POLICE REGULATIONS CONCERNING HEALTH.

17. Not only the registration, but the discharge of a prostitute takes place after examination by the chief surgeon, and the granting of a certificate of health. She must also have a cer-

tificate of health before permission will be granted her to change her residence.

18. The sanitary examination of prostitutes will take place twice weekly, if possible during the forenoon, in their houses. For this purpose they will keep an airy and light room, attend punctually, and be dressed in clean underclothes. Every prostitute will keep a good mother-syringe and will exhibit it every month to the examining surgeon. They will obey implicitly the orders of the examining surgeons concerning their health, and they must be particularly cleanly in their habits.

19. When prostitutes feel sick from any cause they will immediately inform the examining surgeon, or, in the event of his absence, the acting officer of morality.

Prostitutes ill with venereal disease, itch, or sexual sickness will immediately be taken to the general hospital, and they will be treated there at the expense of the meretricial fund.

20. Pregnant prostitutes will be examined by the chief surgeon, who will appoint the time for them to be taken to a lying-in establishment. Their delivery will be at the expense of the meretricial fund. After discharge they will be taken to the general hospital for a certain time, until health is recovered, at the expense of the same fund.

21. Prostitutes ill with other than venereal disease, may remain in their houses by permission of the chief surgeon. A prostitute is not allowed to employ a private physician without special permission.

22. When taken to the general hospital, they are not allowed to take more clothing with them than they will require there, nor any money or jewelry, nor will they be allowed to receive any of these things while there. They are not allowed to fee the waiters or nurses. Nurses will receive from each prostitute, no matter how long she may remain in the hospital, a reward of 75 cents, which amount she will pay on her re-regis-

tration. On her discharge she will be taken home in a cab accompanied by a policeman.

23. Prostitutes having venereal disease, or during menstruation, are forbidden under penalty of the highest imprisonment to have sexual intercourse with any man. They are also forbidden to have connection with a sick man. They will be justified in notifying the police authorities of the fact, should a man ill with venereal disease ever visit them.

#### 4. a. REGULATIONS FOR PERSONS KEEPING PROSTITUTES.

24. Persons who take prostitutes for board and lodging are subject to the control of the police of morality, regulations 1, 4, 6, 8, 9, 10, 11, and 12 will apply to them. They will be held responsible by the police for the obedience of the regulations by themselves and the prostitutes they harbour. They will allow their houses to be inspected whenever the police request them.

25. Permission to keep prostitutes for board and lodging must be obtained from the acting officer of morality. When granted, the petitioner will receive a copy of these regulations, a book of control to be used by the examining surgeon, an account-book for the meretricial fund, and a number of tariffs. Permission is given for a specified house. Removal from it requires special permission.

26. No one is allowed to harbour a registered prostitute without permission from the officer of morality. When a non-registered woman is taken for board, the bureau of morality must be notified, not later than nine o'clock the following morning, and the keeper of the house will be held responsible for her virtuous conduct until that time. It is strictly prohibited, on pain of the most severe punishment, to induce a non-registered woman to commit prostitution.

When a prostitute removes from a house secretly, the bureau

of morality will be immediately notified, or not later than the following forenoon. Her book of examination and account-book will be presented at the same time. Notification of removal must be made eight days in advance.

27. The accounts between the keeper and the prostitute are subject to the control of the police authorities. A separate counting-book must be kept for each prostitute, according to a prescribed form. It must be balanced every Saturday and signed by the prostitute. The books must be presented at the bureau of police every two months, for revision and stamping. The book will be retained by the prostitute. The books of prostitutes living in "Newtown" must be presented during the months of January, March, May, July, September, and November, and the books of those living in "Oldtown," during the other months and not later than the 10th of each month.

28. Regarding payment for board and lodging, an agreement will be entered into between the keeper and prostitute. The latter will be protected from extortion, and the agreement will not be binding with the police authorities in all cases.

Keepers are especially prohibited: 1st. To lend a prostitute of the first class more than \$90, and one of the second class more than \$45. 2d. To hire them jewelry or clothing. 3d. To importune them to buy anything, or in case of their buying anything for them at their request, to charge more than 25 per cent. profit. 4th. To demand of them a present, or to accept a present from them, either for themselves or their families.

29. Keepers are strictly prohibited, on pain of severe punishment, to act imperiously or violently towards the prostitutes; on the contrary they must protect them and prevent their committing excesses. They are not allowed to limit the personal independence of the prostitutes more than is required by these regulations; particularly must they not force them to prostitution. Prostitutes desiring to make a complaint against their

keeper, may do so before the police authority or the examining surgeon.

30. Prostitutes must be free from debt to their keeper before changing for another one.

31. Keepers of prostitutes are required to make the following payments to the meretricial fund, viz: For obtaining permission, \$1.50; for removing into another house, 75 cents. Those who keep prostitutes of the first class, monthly, \$2.65; of the second class, \$1.85. For a book of regulations and a number of tariffs, 75 cents; for a book of control, 45 cents; and for a counting-book, 60 cents.

*b.* REGULATIONS FOR THOSE WHO LET ROOMS TO PROSTITUTES.

32. Any person letting a room to a prostitute is subject to the control of the police authority. Paragraphs 1, 4, 6, 8, 9, 10, 11, 12, and 17 will apply to them.

33. No person is allowed to let a room to a prostitute without special permission from the acting officer of morality. (See paragraphs 7, 24, and 26.)

34. Paragraph 27 will apply to them.

35. It is not permitted to keep private rooms for purposes of prostitution, unless a prostitute reside in them.

5. MEDIATOR FOR LODGINGS.

36. Prostitutes and keepers of them requiring a place of abode or lodgings, may take the advice of women known as mediators for lodgings, to prevent their being cheated by house renters. The mediators are under the control of the moral authorities.

37. These mediators are allowed to interfere only with registered prostitutes; they are subject to these regulations, particularly paragraphs 26, 30, and 34, and it is their duty to act with

truth and honesty. They are responsible to the police authority for honest dealing in the providing of houses.

38. A mediator is not allowed to accept presents from prostitutes or their keepers, nor no higher sum for her services than is allowed by the following tariff, viz: Every brothel-keeper will pay her 90 cents, provided that by her mediation a prostitute enters the brothel. When a prostitute removes from one keeper to another, the latter will pay the mediator 90 cents, also any claim the former keeper may have, not exceeding \$30; for every \$15 more than that sum an extra charge of 15 cents will be allowed.

#### 6. DETERMINATION OF PUNISHMENTS.

39. Any violation of these regulations by persons subject to them will be punished by a fine not exceeding \$75, or by imprisonment not exceeding two months. There can be no appeal upon conviction.

Prostitutes obstinately and persistently violating these regulations and continuing to practice prostitution, will be imprisoned in the House of Correction two years.

By authority of the police.

HAMBURG, *October*, 1871. Reissued in 1875.

#### A P P E N D I X .

##### TARIFF.

(See paragraph 11 of Regulations.)

Champagne, first quality, per bottle, \$3; second quality, \$2.25. Rhine wine, \$1.50. Port wine and Madeira, each, \$1.50. Red and white wine, each, 90 cents. Sherry, \$1.50. Porter and ale, 45 cents, pints, 22 cents. Punch and grog per glass, 11 cents. Other drinks at bar-room prices.

By authority of the police.

HAMBURG, *October*, 1871.



To avoid as much as possible having visitors arrested on account of non-payment of debts to prostitutes or their keepers, the latter are advised to obtain payment in advance. It is their own fault if they afterwards receive no pay.

By authority of the police.

HAMBURG, *April*, 1873.

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LAW RESPECTING MEASURES TO BE TAKEN TO PREVENT THE  
PROPAGATION OF VENEREAL DISEASE IN DENMARK.

[A translation.]

We, Christian the Ninth, by the grace of God King of Denmark, of the Wends and Goths, Duke of Sleswig, Holstein, Stormarn, Ditmarsh, Lauenburgh, and Oldenburg, make known by these presents:

The Diet has approved and we have by our consent confirmed the following law:

1. Persons suffering from venereal disease, whether able or not to defray the expense of their cure, are entitled to claim medical attendance at public expense. They are bound to submit to such attendance unless they can prove that they are under private medical attendance. If the circumstances of the person affected are such that the infection of other persons can only be satisfactorily prevented by their removal, or if they do not observe the instructions given in order to prevent contagion, they must be taken to a hospital to be cured. An order for their removal, if necessary, will be given by the county magistrate (in Copenhagen by the prefect of police), with the approval of the minister of justice, and they can be forced to obey the regulations by coercive fines inflicted by these authorities. Persons receiving support from the poor-board, suffering from venereal disease, will be taken to a hospital for treatment. If after the cure of the disease there is reason to fear its reappearance,

ance in a contagious form, the physician who has attended the patient will order him to appear before him at a fixed time, or to produce a certificate from an authorized physician that such reappearance has not taken place. This injunction may also be enforced by coercive fines dictated by the before-mentioned authorities.

2. A child suffering from venereal disease must not be given to be suckled by other women than its own mother; nor is any nurse, knowing or supposing herself to be suffering from venereal disease, permitted to take the child of any other woman to suckle it. Transgressions of this regulation incur the penalty mentioned in paragraph 181 of the general civil penal law, and the transgressor, if the disease has been propagated, will indemnify the infected persons for the expenses of their cure, and also for the suffering and loss occasioned by the disease.

The same duty of indemnification is incumbent on any person who gives a child to nurse, knowing that it is suffering from venereal disease, or suspecting it to be so, or who gives a child, suspected of being diseased, to be suckled without previously informing the foster parents or the nurse that the child is suffering or suspected.

These legal provisions are applicable to public authorities who place children to be fostered or nursed.

A child is to be looked upon as suspected of suffering from venereal disease, even if no symptoms have been observed, if the mother is suffering, or has formerly been suffering from the disease in any of its constitutional forms, and three months have not elapsed after the birth.

3. When a female, although not under police supervision as a prostitute, is strongly suspected of earning her livelihood by prostitution, she will be taken before the authorities and cautioned and informed regarding the consequences of her transgression. She will if she consents, or admits to be a prostitute,

be subject to medical examination, and if found to be suffering from venereal disease, be submitted for medical treatment according to paragraph 1. The medical examination can be made by a duly authorized and instructed woman; in that case the examination will be compulsory.

4. Paragraph 180 of the penal law is changed in such a manner, that the penalty of imprisonment mentioned in it may, where no compulsory work-houses exist appointed by law for expiating punishment for vagrancy, be sentenced to compulsory work for a period not exceeding ninety days. When a woman is to be punished according to paragraph 180 of the penal law, she must first be examined by a physician, and if found suffering from venereal disease, submitted for treatment, according to paragraph 1. After having suffered punishment she will again be cautioned according to paragraph 3, and may then be submitted to the police authorities, according to the following paragraphs.

5. When a woman, in accordance with the foregoing paragraph, is under the supervision of the police, or voluntarily places herself under the same, she will be ordered by the police to submit to medical examination at fixed periods, and to notify them whenever she changes her lodgings. She will be registered in the police journals. When, on examination, she is found to be suffering from venereal disease, she will be treated as directed in paragraph 1.

6. Transgressions of the injunctions given in the preceding paragraph are punishable by imprisonment on bread and water for a period not exceeding four days; imprisonment with usual prison fare not exceeding sixteen days, or compulsory labor not exceeding twenty-four days. (See paragraph 4.) If such a woman does not present herself for examination, and has no admissible reason for her absence, and is afterwards found to be suffering from venereal disease, she may in the mean time, if re-

siding in Copenhagen, or any other place having adopted the provisions of the law of February 4, 1871, liber C, by which legal provisions respecting the inspection of licentious women have been enacted, be submitted to the rules and regulations of that place concerning said inspection, but she cannot be ordered to live in any public establishment, unless her future conduct should necessitate it.

7. If a woman who has already been punished according to paragraph 180 of the penal code, is again found guilty of prostitution, she shall, besides being punished as laid down in paragraph 6, be placed under supervision of the police, and be subjected to the regulations provided in the law of February 4, 1871.

8. The supervision mentioned in paragraph 5 will cease after the expiration of six months if the woman has not been guilty of the transgressions mentioned in paragraphs 6 and 7, or if she in the mean time has not volunteered to be under such supervision. In case any prostitute shall reform and there is a reasonable expectation that the reformation will be permanent, the prefect of police may before the expiration of the six months discharge her from supervision.

9. The medical examinations mentioned in this law are, if at the place in question there is no police physician, to be made by the public physician of the place, in such places as the police may indicate. For this the physician will receive an annual remuneration, to be determined by the municipal authorities and approved by the minister of justice, or if it is not determined and approved, a payment of \$1 for the first examination made at any one time and place, and 25 cents for each succeeding examination made at the same time and place. These fees will be paid out of the public funds of the town; in the country, from the fund of repartition of the district, and in Bornholm from the united fund of the town and district.

The physician will not be separately paid for a certificate stating whether the person examined is free or not from venereal disease.

The medical examinations mentioned in paragraphs 3 and 5 may, with the permission of the prefect of police, and on condition that all the regulations be observed, be made by an authorized physician approved by the police, in which case the woman herself will pay the necessary fee.

10. Those who at public expense are taken to a hospital to be treated for venereal disease are not permitted to leave the hospital before they have been discharged by the physician of the hospital. Transgressions of this rule are punished by imprisonment with bread and water not exceeding 5 days, or simple imprisonment not exceeding one month.

11. Lawsuits in consequence of paragraphs 4, 6, and 10 of this law are prosecuted in the same manner as police cases, but in Copenhagen with closed doors.

12. The police can forbid landlords of public houses to harbour or lodge prostitutes. They can also forbid prostitutes to give public entertainment or to serve as barmaids, &c., in public places. Violation of the foregoing, or the screening of prostitutes, or the assisting or inducing them to practice prostitution, or lodging them knowing them to be prostitutes, or the violation of the law of October 11, 1863, or that of February 4, 1871, relating to the supervision of prostitutes, will be punished by sentence of any county magistrate or city prefect of police by a fine not exceeding \$25, imprisonment on bread and water not exceeding four days, or imprisonment with usual prison fare not exceeding sixteen days, or compulsory labor in the workhouse not exceeding twenty-four days.

To which all parties concerned have to conform.

Given at Amalienberg, the 10th April, 1874, under our royal hand and seal.

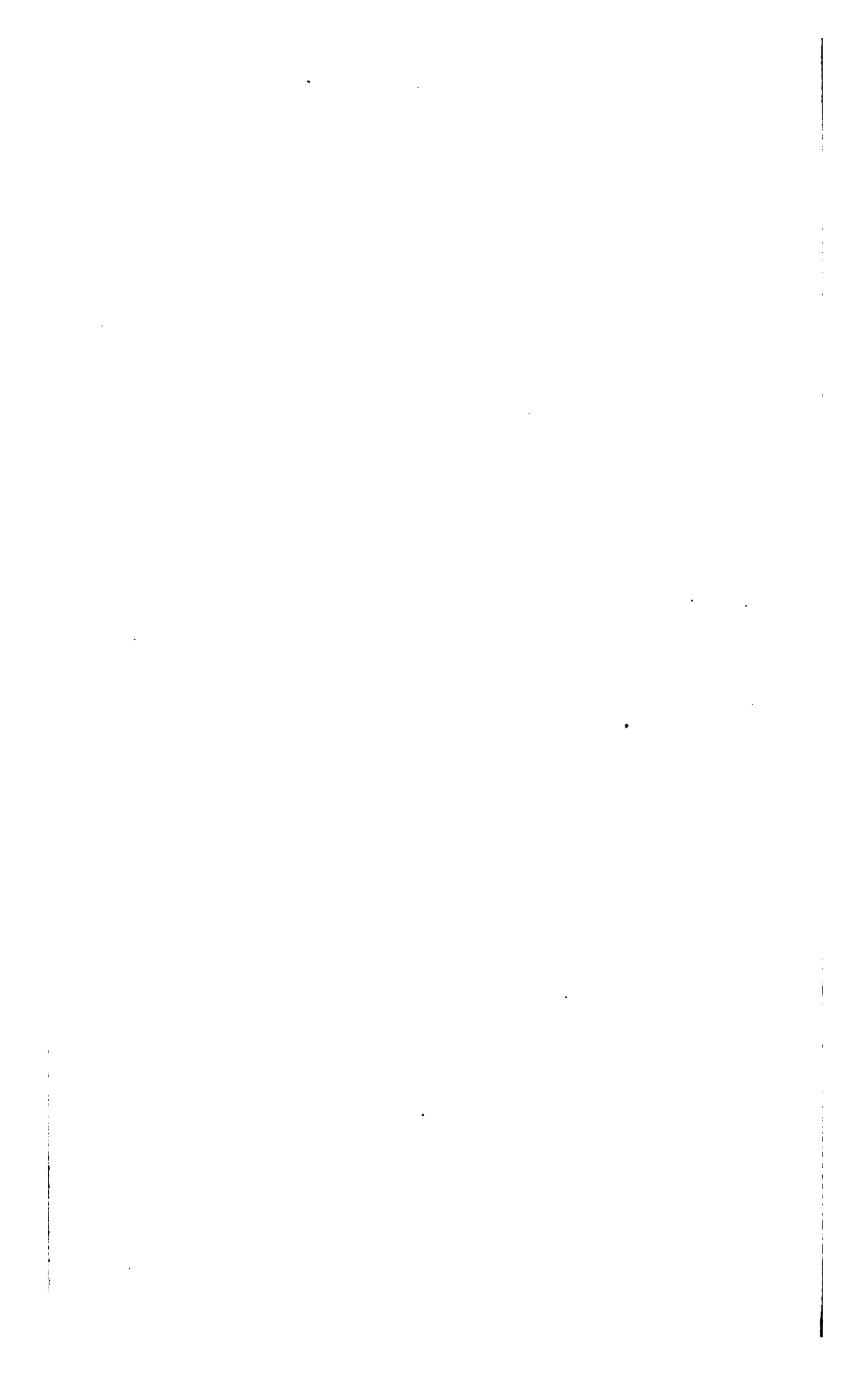
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ASIATIC STATION.

7 BY





## ASIATIC STATION.

U. S. S. TENNESSEE.

REPORT OF MEDICAL INSPECTOR THOMAS J. TURNER.

Although aware of the shortcomings of this report, I believe it embraces most of the surroundings that imperil the health of the crew.

The prevention of disease is a section of medicine demanding much study and cautious research, for it reaches from the individual to grasp the masses and assumes in such character the dignity of statesmanship. It is here that a medical officer comes in contact with those in command. Infrequently the suggestions of the medical officer upon the hygiene of a vessel are accepted; more frequently, however, any hint as to the preservation of the health of the crew is considered as officious, as an attempt at interference, or as a reflection upon the so-called discipline; the officer classified with the meddlesome, intrusive, or annoying, and very early reminded that "in the opinion of the commanding officer" he should confine his attention to his legitimate duties. It is not understood by many naval officers that hygiene is a legitimate and perhaps the most important part of a medical officer's duty.

Some few comments upon the discipline of the Navy have been added. A more extended observation in this direction is necessary, in order to determine fully its great effect upon health, and more especially to determine its medico-legal relations in respect to punishment. I am aware that this is considered by some as not the subject upon which a medical officer may express an opinion, but by discipline, however, I do not mean that submissive obedience without remonstrance, which is too

often enforced by a power that considers itself superior to the humanity that is around it, supposed to be endowed with wisdom to judge, but which undoubtedly has the right to condemn and the might to inflict punishment, but that other discipline affecting all, which is founded upon respectful and hearty obedience to law, order, and understood subjection to rule, and which is beyond the domain of whim or caprice. Intimately associated as discipline is with the *morale* of men, it is the animating fire that incites *physique* to associated and concerted action, and from that fact presents itself for the consideration of the sanitarian.

With this preface I have to present the following remarks:

The United States steamer Tennessee, the flag-ship of the Asiatic Station, was commissioned for sea-service on the 1st of May, 1875, at the United States navy-yard, New York.

This vessel is a wooden, ship-rigged, full-powered screw-steamer, having a displacement of 4,240 tons, a tonnage of 2,135 tons, and is classed as a second-rate. Her length over all is 353 feet; breadth of beam 45 feet; and a mean draft of water of 20 feet.

Her battery of 23 guns, carried on two decks, consists of one 60-pound Parrott rifle, pivoted on the forecastle; two 11-inch Dahlgrens, pivoted on the spar-deck, and two 100-pound Parrott rifles in broadside, also on the spar deck, with eighteen 9-inch Dahlgrens in broadside on the gun-deck.

The Tennessee has been recently fitted with compound engines, has 10 boilers with 2 furnaces to each boiler, divided into two groups, one group of 6 boilers in the forward fire-room and one group of 4 boilers in the after fire-room, the engine being located between. These boilers have a heating surface of 12,835 square feet, plus 1,000 square feet of superheating surface, and are to carry an estimated steam-pressure of 65 pounds. The boilers and engine are all below the water-line of the vessel.

The complement of this vessel for her present administration is as follows: 41 officers, and 458 crew, a total of 499 persons. The relations of age, weight, and height, as factors in determining the military strength of a nation (Aitken, Hammond) have been grouped in the annexed table, and it exhibits also the care used in the selection of the crew at the recruiting stations.

Rank.	Whole number.	Age.		Weight.			Height.		
		Oldest.	Youngest.	Average.	Heaviest.	Lightest.	Average.	Tallest.	Shortest.
Petty officers.	82	55	22	Yr. m.	201.5	115.5	Pounds.	71.5	Inches.
Seamen, 71; seamen, extra, 4	75	59	22	33 7	191	115	149.5	61.25	66.5
Ordinary seamen, 70; ordinary seamen, extra, 3	73	42	19	32 2	182	119.5	147.2	60	65.83 1
Landsmen, 104; nurses, 2	106	47	17	24 9	189	96.5	140.8	60	65.16 1
First-class firemen	26	44	24	33 1	189.5	126.5	144.7	60	66.01 1
Second-class firemen	22	38	22	33 9	184	139	157.1	63.5	67.46 1
Boys	11	21	15	29 2	153	114	153.3	63.25	68.98 1
First-class musicians, 9; second-class musicians, 6	15	44	17	17 4	153	114	130.8	70	63.63 1
Marines, 46; marines, music, 2	48	41	17	30 5	164.5	110	139.1	58.5	64.83 1
		13.11	21	28 2	176	120	147.5	72	61.25
		13.11	13.1		97	92		55.5	55
Total	456								

It is stated by writers on life assurance (Brinton, Allen) that an adult male in good health, 66 inches in stature, should weigh rather more than 140 pounds. With this as a standard of comparison, the table exhibits that the relations of age with height and weight are correlated in a great degree. The average age of the crew is a fraction below that at which the regulations permit a landsman to be enlisted, *i. e.* 33 years (U. S. Naval Regulations 1870, p. 1344). The average weight, determining in a measure physical development, is in proportion to the height. The crew of the Tennessee is therefore an exceptionally good one, so far as physical development is concerned, and the causes that tend to depress the health of these men will be found in defective hygiene.

The nationalities of the crew in the annexed table are given as a fact in the ethnic history of seamen, and the trades or occupations previous to this cruise are tabulated, also, as a single contribution to the little that is known regarding the influence of "habit" upon health.

NATIVITY.

	Number.		Number.
New York .....	82	Michigan .....	1
Massachusetts .....	52	Iowa .....	1
Pennsylvania .....	17	Missouri .....	1
Maryland .....	14	Wisconsin .....	1
Connecticut .....	11	Louisiana .....	1
Maine .....	9	Illinois .....	1
New Jersey .....	8	Vermont .....	1
Virginia .....	7		—
District of Columbia .....	4	Native .....	224
Georgia .....	3	Ireland .....	77
Rhode Island .....	3	England .....	39
South Carolina .....	2	Germany .....	22
Ohio .....	2	China .....	15
New Hampshire .....	2	Scotland .....	13
California .....	1	Sweden .....	12

	Number.		Number.
Italy .....	12	Belgium .....	1
Denmark .....	8	Channel Islands .....	1
France .....	4	Australia .....	1
New Brunswick .....	4	New South Wales .....	1
West Indies .....	4	Cuba .....	1
Canada .....	4	Portugal .....	1
Nova Scotia .....	3	Wales .....	1
Finland .....	2	Corfu .....	1
Newfoundland .....	2	Prince Edward Island .....	1
Norway .....	2	Foreign .....	234
Russia .....	1		
Holland .....	1	Total .....	458

## OCCUPATION.

	Number.		Number.
Mariners .....	164	Watchman .....	1
None .....	44	Yeoman .....	1
Firemen .....	43	Printer .....	1
Soldiers .....	24	Ship-carpenter .....	1
Musicians .....	28	Ship-joiner .....	1
Clerks .....	21	Steward .....	1
Machinists .....	14	Locomotive-engineer .....	1
Painters .....	13	Engine-fitter .....	1
Carpenters .....	11	Engineer .....	1
Laborers .....	10	Skin-dresser .....	1
Waiters .....	10	Tanner .....	1
Shoemakers .....	7	Cabinet-maker .....	1
Moulders .....	7	Bronzer .....	1
Blacksmiths .....	6	Porter .....	1
Bakers .....	4	Upholsterer .....	1
Butchers .....	4	Iron-roller .....	1
Cooks .....	4	Plasterer .....	1
Apothecaries .....	4	Marble-finisher .....	1
Boiler-makers .....	3	Barber .....	1
Copper-smiths .....	2	Wood-carver .....	1
Tailors .....	2	Car-driver .....	1
Coopers .....	2	Bricklayer .....	1
Steam-fitters .....	2	Stone-cutter .....	1
Caulkers .....	2	Gas-fitter .....	1
Tinsmiths .....	2	Varnisher .....	1

The following table furnishes all the data collected regarding the space in which nearly five hundred men "live":

	Cubic feet.
The cabin on the spar-deck has a cubic air-space of.....	5, 268
The cabin on the gun-deck has a cubic air-space of.....	9, 710
The gun-deck, exclusive of the cabin, has a cubic air-space of.....	74, 841
The berth-deck has a total cubic air-space of.....	66, 974

All rooms are included in this total of cubic feet on the berth-deck, but the engine and chimney hatches, around which there are bulkheads, as usual, are excluded.

The number of state-rooms in the wardroom, 20.

	Cubic feet.
Average cubic air-space for each room.....	338
Giving a total for all the rooms of.....	6, 760
The cubic air-space in the wardroom, excluding state-rooms and pantry.....	6, 932
The cubic air-space in the steerage, within the room bulkheads ....	6, 478
The cubic air-space in the sick-bay.....	4, 680
The cubic air-space allotted for a prison.....	211+

There is one person on board to about every 4.25 tons, and deducting the space occupied by each man (2.26+ cubic feet Fonssagrives), the bags, mess-gear, stanchions, etc., I am of opinion that, with the present complement, each person has on an average from 130 to about 150 cubic feet of air-space, an amount but a short remove from the least assigned quantity given by any authority as the "lowest estimate consistent with the limits of safety as regards health." (Arnott.)

*Ventilation.*—The spar-deck cabin is ventilated by large gun and air ports with the usual sky-lights. These openings are amply large for the admission of air. The natural modes of ventilation secure all the necessary changes in the air of this apartment. The gun-deck cabin is ventilated in the same manner.

The gun-deck, the sleeping-apartment of about one-half the crew, is ventilated by 20 large gun-ports, each 4 feet 8½ inches

by 3 feet 3½ inches, and when these are closed of necessity by stress of weather, 24 air-ports, each 6 inches in diameter, of the usual dimensions, which have been placed very judiciously at intervals, about 18 inches below the spar-deck, in the drift between the guns, can be used as ventilators.

The large hatches in the spar-deck render this comfortable, so far as the respiratory act is concerned, and no objection can be found to its ventilation.

The berth-deck is the region of poor ventilation, and the sleeping-place of the remaining half of the crew. Twenty-nine air-ports on each side, of the usual dimensions, which admit the air only in favorable weather or in port, when they can be opened, and the hatches, are the principal means of ventilation. These hatches, eight in number, excluding the engine-room, chimney-hatches, and a hatch over the wash-room of the engineers' division, have a superficial area of 287½ square feet. A copper ventilating-shaft, 18 inches in diameter, fitted with a movable cowl, running from the top-gallant forecabin to the berth-deck, serves as a ventilator to the sick-bay and that extreme end of the vessel; and a square shaft, 3 feet 4 inches by 2 feet 4 inches, extending to the poop from the wardroom, completes the avenues for the entrance and exit of air. On this deck are the sick-bay, the cells, the mess-gear, and bags of the crew, the engineers' store-room, the master-at-arms' room, the dispensary, the paymaster's office, the admiral's and captain's store-rooms, the armory, the rooms for the warrant-officers, their dining-room, the steerages, and wardroom. The ordinary diffusive movement of air is not sufficient to properly ventilate this deck. In hot weather wind-sails have been frequently used with some good effect. I may remark here that the smallest attention compatible with deck-duty is paid to the wind-sails. They are not ornamental, but it seems to be an idea with most executives that the heads of all the wind-sails should be in the



same horizontal plane, without regard being had to their use as conduits for air, the place to which they lead, or length of hoist.

The orlop and holds are not ventilated at all, save by two of Thier's automatic ventilators, well forward on the berth-deck, which are of no service in port.

Seldom does the foot of a wind-sail ever drop below the plane of the surface of the berth-deck, and there is practically over 300 feet in the length of the hold and bilges of the Tennessee without any means of ventilation. Here are the yeoman's stores, the bread-rooms, the chain-lockers, the wet provisions, store-rooms, etc. There is no circulation of air here, and none can take place in the spaces that are enclosed below, save by artificial means. There is an attempt at ventilating the fire-rooms by means of sheet-iron ventilators, two for each fire-room, 16 inches in diameter, commencing about 8 feet from the floor of the fire-rooms and extending to about 10 feet above the spar-deck, fitted with cowls that can be trimmed to the wind. The engine-room is usually ventilated by a very large wind-sail. The shaft-alley, 106 feet in length, 7 feet high, with an average width of 4 feet, is almost entirely unventilated.\* Men can seldom perform their duties for an extended length of time, say a watch, in this locality without suffering. Inquiry of the engineer officers on board reveals the fact that they relieve their men every 15 or 20 minutes when it is necessary for them to be at work in this dark, unwholesome, unventilated place. This should be remedied by a large copper or iron tube, reaching from the after part of the shaft-alley to the poop, and fitted with a cowl. The smallest ray of a means of ventilation seems to have glimmered over the mind of the constructor of the Tennessee in the following particular instance: At the junc-

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\* In the plan of the Tennessee, two ventilators are marked as ventilating the shaft-alley. I have tried to discover them personally, and am still in doubt as to their existence.

tion of each deck with the sides of the ship, on the under surface, long slots, like the ancient air-strake, have been cut, extending deep enough to let the air of the bilges find its way by diffusion into all the rooms in both cabins and ward-room. In the ward-room and cabins these have been closed by strips of sheet-lead, but they are still open to sight on the gun and berth decks.\* It is difficult for any one, considering the health of seamen, as it is affected more or less by impure air, and the pretensions of naval architecture, to imagine a more stupid resurrection of a thing of the past.

I suggested on one occasion that the apparatus of Brindejone (Foussagrives) be made on board and used, presenting a drawing and section of the same, but beyond that no further notice was taken of the matter.

Before the sailing of the vessel I had hoped to secure a thorough ventilation of the Tennessee in every part by the application of the system of "extraction," using the means suggested by Assistant Engineer George W. Baird, U. S. N., extending it, however, to all sections of the ship.

This system of extraction of air by means of rotating fans, moved by the engines, has been applied by the Messrs. Napier to some of their large vessels. The foul air of the hold, bilges, etc., is drawn through tubes, leading from all parts of the ship, at the rate of 5,000 cubic feet per minute. At this rate the diffusion of the foul air is prevented and the vitiation of the air of the hold and orlop is arrested. There is a necessity for this ventilation of the hold and bilges now. The visitor to the Tennessee generally makes some inquiry as to the color of the paint-work, if his sense of smell should not be acute enough to determine the presence of hydrogen sulphide, the result of the decay of vegetable or animal matter and sea-water. Daniell ascribed, as is well known, the "coast of Africa fever" to this gas. The

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\*These are being closed at present (January 30, 1876) on the gun-deck.

usual constituents of a bilgy odor,  $NH_3$ ,  $PH_3$ , and  $H_2S$ , are all found in the decaying organic matter on shipboard. These gases inhaled pure, produce death; diluted and inhaled, they produce, in a greater or lesser degree, signs of narcosis, and affect the integrity of the blood-corpuscle.

It may not be out of place here to remark that pumping seawater into the bilges of a ship only increases the difficulties that naturally occur. A ship's bilges should be clean, dry, and ventilated. The use of disinfectants is a makeshift. The remarks of a writer in *Naval Science*, London, 1873, "speaking in a sanitary sense, it is as bad to live over an unventilated hold or bilge afloat as to live over a cesspool ashore," apply directly to the "unventilated hold and bilge afloat" of the *Tennessee*.

An additional necessity for the thorough ventilation of the *Tennessee* is apparent to any naval medical officer when he remembers that coal absorbs gases and effete matter floating in the air only to give them out again when heated. The bunkers on the *Tennessee* have a capacity of 400 tons, and the fuel used on the station is principally Cardiff coal, although Takasima has once been used; both coals are very porous and consequently very absorbent. The intense heat of the fire-room, ranging from  $120^\circ$  to  $172^\circ$  Fah., causes these absorbed gases and effete matters to be given off. This source of deterioration of health can only be removed by a full supply of pure air.

In the epidemic of yellow-fever at Rio de Janeiro in 1850 the coal-vessels suffered terribly, and yellow-fever in the *Kearsarge*, on the coast of Africa, in 1866, had its origin from a coal-hulk, under the influences of bad ventilation and high external heat.

Much attention has been paid to the building of this vessel, her engines, the speed she can attain, the battery she can carry, and the length of time she can "keep the seas"; something has been done in the direction of the sailor's food and clothing, very little to his berthing, still less to the air which he breathes. A

man may live days without food, but not five minutes without air.

I can do no better in closing this section upon the ventilation of this vessel than to quote Silliman: "If the transparency of the air was troubled by the exhalations of the lungs as water is by the washings of the body, no argument would be needed to secure proper ventilation, and yet it is quite true that the bodily health suffers more from inhaling effete air than it could from drinking the wash alluded to; and yet," continues the same author, "with what thoughtlessness we resort to crowded and ill-ventilated public places, and drink in the subtle poison exhaled from the lungs, skin, and clothing of every individual in the assembly, remembering that the lungs can discharge their duty to the blood only by a full supply of pure air."

*Lighting.*—On the effects of light upon the health of masses of men, I can offer nothing new. The remarks of Wilson, Pickford, Gihon, J. R. Martin, W. F. Edwards, etc., have all been more or less addressed to the influence of the sun's light. Here the heat undulation and the actinic also co-exist with the light wave, and their separate effects cannot well be disassociated, for, in my opinion, they determine in a great degree perfect nutrition, sanguification, and consequently development. The effect of artificial light has been proved to be injurious on animals and plants by a number of French and German observers. The blanched appearance of the yeoman, of prisoners that have been long in confinement in the "brig" is well known. The absence of light is well known to predispose to inactivity.

The spar-deck cabin is well lighted.

The gun-deck cabin and the gun-deck also receive plenty of light through the ports and scuttles. The berth-deck is lighted at night by two large locomotive-headlights and six lanterns; by day from the hatches, air-ports, and sometimes from candles, enough light finds its way to make this a "light berth-deck" in

good weather; in bad weather it is nothing more nor less than a "berth-deck" such as every naval medical officer of one cruise has seen and never forgets. The gun-deck has for lighting at night six Fresnel lanterns.

*Warming.*—The spar-deck and gun-deck cabins are warmed by steam heaters. The gun-deck has the ship's galley, the admiral's and captain's galley, as a means of warming.

The chimneys of both the forward and after boilers also help to raise the temperature of this deck when the ship is under steam. The column of heated air from the fire-rooms at times has rendered this deck hardly habitable.

The following facts embodied in a letter to Capt. W. W. Low, U. S. N., commanding the United States ship Tennessee, show the high range of temperature to which a portion of the crew were exposed:

On the 28th June, 1875, in latitude  $39^{\circ}.26'$  north, longitude  $69^{\circ}.18'$  west, abreast the forward fire-room hatch, before the hammocks were piped down, six boilers under banked fires, the upper half-ports being open on the gun-deck, the thermometer marked  $82^{\circ}$  Fah. The starboard upper half-ports being closed and hammocks down, other circumstances being the same, the temperature at 9.30 p. m., on a level with a slung hammock, was  $110^{\circ}$  Fah. The next day, June 29, 1875, all ports being open, no hammocks down, and the ship under steam, the temperatures varied from  $102^{\circ}$  to  $108^{\circ}$  Fah. in the same locality. At this present writing the forward fire-room hatch is being bulkheaded off from the gun-deck by plates of boiler-iron, and it is hoped that this will reduce the temperature of the deck and assist in the ventilation of the berth-deck and fire-room.

The berth-deck is heated by eight steam-heaters, one large one in the sick-bay, two in pairs at different distances on the deck, one pair and one single one in wardroom. The fire-rooms and engine-room are bulkheaded off from this deck, with shift-

ing windows in the bulkhead by which the temperature of the deck can be increased or diminished at pleasure. There can be no objection to this cleanly and safe mode of warming. In cold weather in port some means should be devised to keep the gun-deck warmer than it is at present, without interfering with its ventilation.

*Water.*—Distilled water has for the most part been used for drinking purposes on board. The Tennessee carries, in 11 iron tanks, 7,793 gallons of water; this quantity is increased to 9,645 gallons when her casks and breakers are filled, enough to supply her complement for 20 days, allowing the usual gallon per diem. The apparatus for distillation is known as "Baird's," and is calculated to deliver 500 gallons a day; two supplementary distillers, which are simple coils, have been fitted for use on board, capable of producing 500 gallons each per diem. The temperature of the water as it runs into the tanks varies from 92° to 102° Fah. It is, of course, unaerated. After cooling and prolonged exposure to the air it becomes partially potable. Using two tanks, it will be observed that before one has cooled to the temperature of the surrounding air the other is exhausted, and in consequence of this we have occasionally been supplied with water "warm from the still." A great disadvantage of this warm water running into the tanks is that the hold becomes heated. The only distiller that, in my experience, furnishes good, potable water for ship's use is Normandy's. In this apparatus the distilled water runs from the condenser perfectly aerated, and at the temperature of the sea-water first used. I have already stated that the boilers are estimated to carry a pressure of 65 pounds to the square inch. Evaporation from sea-water occurs under that pressure at 315° Fah., and the chemical reactions between steam at this temperature and the fat acids in the oils used for lubrication take place readily.

The late Medical Director A. A. Henderson, U. S. N., many

years ago informed me that benzoic acid was one of the products of the rearrangement of the atoms of the fats under high pressures and temperatures, and it is positive that most of the water used on board is, to a certain extent, contaminated with the results of these decompositions and recompositions. It is also well known that the magnesium chloride in sea-water is decomposed at lower temperatures, and that water obtained from the distillation of sea-water is faintly acid in consequence. How far the storage of this water in clean iron tanks preserves and renders it fit for drinking purposes I am unable to state, but some observations of Medlock go to show that water in contact with iron has its organic matter removed; the action of the metal upon organic matter being an oxidizing one, converting the nitrogen into nitrous acid, and in this manner breaking up the affinities of the remaining carbon, oxygen, and hydrogen. The same writer states that a part of the organic matter is converted from a soluble into an insoluble state, and in this condition is easily removed by filtration.

The practice of lime-washing, bees-waxing, or lacquering the inside of tanks is one which should never be permitted on ship-board. Upon this fact all writers on naval hygiene are agreed, and I very respectfully suggest that a paragraph to that effect be placed in the new code of regulations. The use of distilled water is a necessity on this station for the preservation of the health of the men.

All examinations made of the water proposed to be supplied from shore has revealed the presence of organic matter in a greater or lesser quantity, at the different ports; and the water has been rejected as unfit for issue on board ship in every instance. Not a port has as yet been visited where good water can be found. At Bombay the sanitary council are engaged in considering the water-supply for that city, and their attention has been specially directed to the supply necessary for the ship-

ping visiting that port. It is not a well-drained city. Colombo is on a flat plain, and is undrained; Penang on a low island, undrained; Singapore, Manilla, Amoy, Shanghai, and Nagasaki all present the same or other more serious objections to the use of water from their rivers, wells, or tanks.

*Want of drainage.*—It is known that a well drains an area of greater or lesser extent, the depth of the well being the axis of an inverted cone, the base extending in a ratio with the depth. The middens, cesspools, and cemeteries of these cities all furnish to the water, and are conveyed by it, the beginnings of fever, dysentery, and cholera.

Rear-Admiral John Rodgers, U. S. N., when in command of this station in 1870, issued the following order as part of the sanitary regulations of the squadron: "No water should be used at any time for drinking or cooking purposes except such as has been distilled by a suitable condensing-apparatus or obtained from Hong-Kong." His successor, Rear-Admiral Thornton A. Jenkins, issued as part of the sanitary regulations of the squadron, the following order:

"Water obtained from shore is a great source of sickness on this station, and therefore *only in exceptional cases* will any other water than that distilled on board ship be used for drinking or cooking purposes. The health of the crew is to be held above all other considerations. No water is to be used on board ship at any time or place until it has been subjected to a test by the medical officer and pronounced by him to be pure and free from unwholesome qualities, and this is to be done each time the water-boat comes alongside the ship. The commanding officer of a vessel will in every case report to the commander-in-chief when he has taken water from the shore, and he will state his reasons for so doing."

I would respectfully suggest that a paragraph embodying the subject-matter of the above orders be submitted as one of the



sanitary requirements for this station and included in the new code of regulations.

*Food.*—The Tennessee ready for sea, carries four months' provisions for her complement. The ration is the best that has ever presented itself to my notice as to its quantity and quality. It is very well known to medical officers of the Navy that about two rations in every ten are commuted by the different messes on board.

The Navy ration appears to have been devised for use in temperate climates. No change is at present recommended in its quantity, as the consumption of food in disciplined masses of men is apt to regulate itself; nor its quality, either, as that is supposed to be determined by the inspecting officers at the receiving depots. Tissue-waste and repair depend, as has been determined by physiologists, upon physical exertion, and in the term "physical exertion" I include the work done by the heart, lungs, &c., upon primary and secondary chemical changes in the tissues; both these, however, are modified by climate and especially temperature. The histogenetic and calorific values of the components of the Navy ration at sea and in port are herewith submitted. They have been calculated from the tables of Moleschott and De Chaumont. I beg leave in this connection to acknowledge my indebtedness to Assistant Surgeon C. H. H. Hall, U. S. N., for the care with which he has made a great portion of these calculations for me. These tables determine the nutritive and force values of the articles chemically, but physiologically their values are determined by their capability of being digested and assimilated. Accepting the observations of the later writers on the subject of food, it may be stated that an adult requires daily about 5 ounces of tissue-forming and 35 ounces of heat-making food.

As regards absolute quantity, an adult 33 years of age, weighing a little over 140 pounds, doing ordinary work, requires 40

ounces of solid food, and to this must be added from 50 to 80 ounces of water; so that it may be stated that such a person consumes daily from one-twentieth to one-twenty-fifth of his weight.

*United States Navy ration at sea.*

STATEMENT IN OUNCES OF CHIEF ALIMENTARY PRINCIPLES.

Article.	Weekly quantity.	H <sub>2</sub> O.	N.	C H.	Fats.	Salts.	Equivalent in foot-tons.
	<i>Ounces.</i>						
Preserved meat .....	24	12.96	6.624	.....	3.708	.708	1,320
Beef, salt .....	32	15.715	8.166	} Extractives, 1.65	.0576	6.742	.....
Pork, salt .....	48	.....	4.224				
Biscuit .....	98	7.84	15.288	71.932	1.274	1.666	14,700
Flour .....	16	2.4	1.76	11.248	.32	.272	2,376
Beans .....	19.5	3.12	5.245	9.7305	.39	.468	2,827.5
Rice .....	8	.8	.4	6.656	.064	.04	1,162.4
Potatoes (desiccated)*	4	.....	.24	4.744	.016	.16	616
Butter .....	4	.24	.012	.....	3.64	.108	1,123.6
Sugar .....	28	.84	.....	27.02	.....	.14	3,612
Total .....	281.5	43.915	41.959	131.3805	44.6536	10.304	.....
Daily average .....	40.214+	6.2735+	5.9941+	18.7686+	6.379+	1.472+	.....
Daily water-free food.	32.6137	.....	.....	.....	.....	.....	.....

\* Taken as equalling 16 ounces fresh

SUMMARY OF DAILY WATER-FREE FOOD.

Alimentary principles.	Grains.	Grammes.
Albuminates .....	2,622.41875	169.91+
Carbo-hydrates .....	8,211.2625	532
Fats .....	2,790.8125	180.1 +
Salts .....	644	41.7
Total .....	14,268.49375	923.71

*United States Navy ration in port.*

## STATEMENT IN OUNCES OF CHIEF ALIMENTARY PRINCIPLES.

Article.	Weekly quantity.	H <sub>2</sub> O.	N.	C II.	Fats.	Salts.	Equivalent in foot-tons.
	<i>Ounces.</i>						
Beef, salt .....	32	15.715	8.166	{ Extractives, } 1.05	.0376	6.742	.....
Beef, fresh .....	64	48	9.6	.....	5.376	1.024	.....
Pork, salt .....	16	.....	1.408	.....	11.728	.....	.....
Bread, wheat .....	98	39.2	7.84	48.22	1.47	1.274	10.201
Flour, wheat .....	18	2.4	1.76	11.248	.32	.272	2.376
Beans .....	19.5	3.12	5.245	9.7305	.39	.468	2,827.5
Rice .....	8	.8	.4	6.656	.064	.04	1,162.4
Potatoes, desiccated* ..	4	.....	.24	3.744	.016	.16	616
Butter .....	4	.24	.012	.....	3.64	.108	1,123.6
Sugar .....	28	.84	.....	27.02	.....	.14	9,612
Total .....	289.5	110.315	34.671	107.6685	23.0616	10.228	.....
Daily average .....	41.364	15.759+	4.953+	15.3812+	3.2945+	1.461+	.....
Daily water-free food..	25.0897+	.....	.....	.....	.....	.....	.....

\* Taken as equal to 16 ounces fresh.

## SUMMARY OF AVERAGE SEA AND PORT DAILY WATER-FREE FOOD.

Alimentary principles.	Grains.	Grammes.
Albuminates .....	2,394.67812+	155.15 +
Carbo-hydrates .....	7,470.2687 +	484
Fats .....	4,116.07812+	266.68 +
Salts .....	641.0937 +	41.5 +
Total .....	14,622.11864+	947.33 +

These tables suggest that within their limits the articles enumerated may be varied to suit the requirements of nearly all climates.

In the preparation of food the mode which secures the least loss of nutritive material has been determined to be boiling; next in order follows roasting, and then stewing. The galley of the Tennessee is Young's patent galley A, No. 3, made in Washington navy-yard, 1871. It has three "coppers," one of 141 + gallons and two of 62½ gallons each, a total capacity of 276 + gallons. The food has been cooked in the usual manner, by boiling. Day by day and month after month of the cruise little or no variation occurs in the cooking to the majority of the

crew, for the present galley is not much changed in essential features from that in existence half a century ago. The idea in the construction of a galley seems to be this: that it should be heavy, cumbersome, and do as little as it can in proportion to its size.

There is no sound reason why variation in the manner of cooking the food of the sailor should not be made, especially when in port. In the not remote future I hope to see the present "ship's galley" consigned to the scrap-heap and a galley like those in use in passenger-steamers substituted, where variety in the cooking of food is the rule.

When the facts of the assimilative act have been exactly determined by the future physiologist, it is safe to predict that the physician will apply them in pathological conditions and use foods cooked in various ways as his principal remedial agents. In addition to the usual ration there have been served out to the messes on the Tennessee canned tomatoes, dried apples, pickles, and desiccated onions, as preserved vegetables, and corned beef, in tins, as preserved meat. Fresh bread has been baked twice a week, and in some instances issued every day. In these days of rapid transit there is not that great necessity for preserved meats and vegetables. However, the rule for foods appears to me to be this, variety, recent, and fresh.

Preserved meats and vegetables are good when recently prepared, but the *slow* chemistry of these viands in hermetically-closed vessels is not well understood.

*Meal-hours.*—There is a physiological reason why meal-hours should follow at stated intervals. The cyclical changes occurring in health determine the sense of hunger (Smith, E., *Cyclical Changes*). Respiration, circulation, and calorification have their maxima and minima pretty well ascertained. When these are below their average normal the ingestion of food causes the pulse to beat more frequently, the respirations to be-

come quicker in number, the temperature to rise, and all the functions to become more active. These facts determine the meal-hours, the early breakfast, the mid-day dinner, and early evening supper. Breakfast is a meal that should never be postponed. The additional ration of tea or coffee and sugar provided by the act of May 23, 1872, has its foundation on a strictly physiological basis. A ration of this kind should be issued after prolonged exertion, under any circumstances.

*Clothing.*—The articles of wear issued to the crew of the Tennessee have been of unusually good quality, so far as my limited observation extends. The climatic changes we have experienced in our voyage out to this port have not been very varied, but the transition from Manila to Shanghai and Nagasaki was rather abrupt, not attended, however, with immediate effect upon the health of the crew. Even in hot climates, the constant use of flannel next the skin is a hygienic fact of great value, and no change in the texture of the clothing should be made.

On this station I would recommend that an addition be made to the kit of the men of a Cummer band, or as it is called in the English service, "a cholera belt." I am well satisfied from personal observation of its usefulness. Whilst off Port Said, Egypt, on the 12th of August, 1875, considering the passage through the Suez Canal, Red Sea, and Indian Ocean to Bombay, almost along the equator of heat, I addressed a letter to Rear-Admiral Reynolds, concerning the cap in use in the Navy, presenting for his inspection and approval a white cap (circular, honorable Secretary of the Navy, February 7, 1873) with attached havelock for use in all the vessels of the Asiatic fleet cruising in the tropics, recommending it for the following sanitary and other reasons: Its weight; the average weight of the ordinary regulation cap with white cap cover is 6.5 ounces avoirdupois. The proposed cap with havelock weighed 4 ounces avoirdupois. This reduction of over one-third of the weight rendered this

head-dress more comfortable. It was made of duck and was light, consistent with durability. The rim was deeper than in the regulation cap, which prevented the crown from resting on the hair, and consequently allowed a thin stratum of air over the scalp. The crown was ventilated by eyelets, as in the cap for officers. It could be easily cleaned. The havelock protected the back of the head and upper portion of the spinal column. The proposed cap and havelock, although not the most desirable or efficient head-dress for the sailor, was, in my opinion, an advance in the direction of health, utility, comfort with durability, and ease of repair. For some reasons unknown it has not been accepted. There is room for improvement in the present unsightly blue cloth cap furnished the crew.

*General considerations.*—I can only group here some isolated facts in the hygienic history of the Tennessee. The great length, narrow beam, and draft of water render this ship a very comfortable one at sea. The oscillations of the vessel are even and slow. I am disposed to ascribe sea-sickness almost entirely to these movements.

When it is remembered that we live under a pressure of nearly 15 pounds to a square inch of surface, that the force-pump action of the heart is estimated at  $13\frac{1}{2}$  pounds, and that in round numbers the barometer falls .001 of an inch for every foot of ascent and diminishes the pressure on the body by nearly 32 pounds, it is very readily seen that the slightest diminution in the aerial pressure will influence the flow of the current of blood from that organ to other viscera. This irregular, minute, but absolute reduction in the pressure of the air by the alternate rising and falling of the ship, her shallow or deep rolling, with the irregular respiratory movement consequent upon her motion, affects the column of blood sent to the brain and medulla. The headache, general indifference, and finally the nausea and vomiting are but reflected phenomena from the

disturbance in the pneumogastric tract. The general system soon tolerates or rather adapts itself to the unnatural movement and the subject is soon freed from "the disease of the sea." These physical facts have led me to add this to the various opinions concerning the causes of nausea marina.

*The sick-bay.*—Whatever of comfort or convenience that can be gathered around one who is sick or wounded on shipboard should be so grouped around the sick-bay, the sailor's hospital afloat. Compare it for a single moment, if such a comparison is possible, with all the surroundings that are found at naval hospitals on shore. I am very well aware that a ship of war is a floating fort, that her battery must be fought with efficiency, that "a ship is no place for a sick man," and that a hundred miles from shore one cannot expect to have all the conveniences that surround modern life, but I am also aware, and length of service has ingrained it personally, "that custom has assigned the forward part of the berth-deck as the sick-bay"—an ill-ventilated, dark, cramped apartment, the worst place that could be chosen for the comfort of the sick. I could here reiterate all that has been said of the ventilation and lighting as applicable to the sick-bay of the Tennessee. A well man requires air and light, but in every hospital in the world the amount given as a standard in health is multiplied many times for those that are sick.

The top-gallant fore-castle in this vessel should be the sick-bay. It could be easily bulkheaded from the deck; it is well lighted, with plenty of air-space, and would in no wise impair the efficiency of the vessel. In time of action such men as are confined to their cots could be removed from this deck to some safer place.

*Engine and fire rooms.*—These places, although below the water-line, are the most vulnerable and dangerous parts of the ship. No naval action to my knowledge has been fought by

vessels having compound engines. In my opinion they are very objectionable as engines for vessels of war: First, on account of the dangers to health of the men employed about them from the necessary high temperatures. Second, the dangers of injury to the crew in action. It may not be difficult, and is certainly of little consequence to determine the difference between being scalded to death at a temperature of  $212^{\circ}$  Fah. or  $315^{\circ}$  Fah., but all the dangers to the crew should be reduced to their minimum, while a maximum of safety is sought. With 65 pounds pressure and the water in the boilers at  $315^{\circ}$  Fah., a well-directed shot entering the boiler or cutting a steam-pipe, would in an instant sacrifice about one-sixth of the crew.

By reference to the tabular statement of the age, weight, and height it will be observed that the engineer force of the Tennessee is composed of the tallest and heaviest men in the ship, with an average age of a little over 31 years for both first and second class firemen. The question of high temperatures as a source of danger to health is a matter that engrosses the attention of naval engineers all over the world. I am informed upon good authority that compound engines partly on this account are not placed in the new vessels of any modern navy. The forward fire-room of the Tennessee, 41 feet 9 inches long, 8 feet high, 9 feet 6 inches between the boilers, has a total of 3,061 + cubic feet of air-space. The after fire-room is 29 feet 8 inches long, 8 feet high, 9 feet 6 inches wide, and has 2,173 cubic feet of air-space. When firing the temperature of the fire-room ranges from  $120^{\circ}$  to  $175^{\circ}$  Fah. The effect of long-continued exposure to these temperatures on men on watch has given rise to a cardiac affection known as the "firemen's heart," and has been well described by Levick (Am. Jour. Med. Science). The etiology of this atonic condition of the heart is easily demonstrated—impure air and high temperature. Without going into the usual physical calculations regarding the rarefaction of the



air at the temperatures mentioned it may be sufficient to state that normal respiration requires a normal amount of oxygen at normal temperatures. Increase in the temperature of the air rarefies it; with rarefaction comes increased respiration to secure the requisite amount of oxygen. The heart's action is also increased, as is shown by the more frequent pulsation. Palpitation occurs as the rapid pulsation fatigues the heart, just as any other muscle becomes tired from work, and with this functional disturbance follows, as intimately as the association between matter and force, structural change. The functional disturbance is followed by organic lesion. To diminish these conditions producing atony of the heart, it has occurred to me that a rearrangement of the watches of firemen and coal-heavers should be made, and that a thorough ventilation of the fire-rooms be hereafter an essential element in the contracts for steam-machinery. To secure fresh air in affections of the heart, a writer in the *Lancet*, about a year ago, devoted a strenuous effort. In four watches these men would secure that rest so absolutely necessary in all cardiac troubles. These remarks are directed to the prevention of heart diseases among firemen. Whether on or off watch, men employed in the fire-rooms or about the engines should not be disturbed nor called for duty on deck.

*Humidity.*—"A damp ship is an unhealthy ship." Such is the expression of the ablest known of all the writers on naval hygiene. I can only add my share to the already overwhelming testimony regarding wet ships. Cook stands foremost in English maritime history as the model navigator. The health of his crews, he, himself, ascribes to the dryness, etc., of his vessels. Collingwood in English naval history is cited as the model captain. The decks of his vessels were kept dry. A damp ship is from that fact the most dangerous element a sailor has to encounter, for it tends to diminish his life and embitter

his existence. Fonssagrives, Lind, Clarke, Craig, Kerauden, Martin, etc., all bear testimony to this most insidious source of impairment to the health of men. Consumption, rheumatism, and heart-disease are the maladies most frequent among seamen of the present day. Dampness and foul air are the causes of these diseases. Captain Murray in H. B. M. S. Valorous, on his return to England in 1823 after a service of two years on the coast of Labrador, was ordered to the West Indies. By a proper clothing of his crew (150 men), notwithstanding the sudden change, he returned without the loss of a man. He also adds "that every precaution was used by lighting stoves between decks and scrubbing with hot sand *to insure the most thorough dryness*, and every means put in practice to promote cheerfulness among the men." This same officer when in command of H. B. M.'s gun-brig Recruit, which lay about nine weeks at Vera Cruz, used the same means to preserve the health of his crew when "other ships anchored around him lost from 20 to 50 men each; and although constant communication was maintained between the Recruit and other vessels, and all were exposed to the same external causes of disease, no case of sickness occurred on board his vessel."

The Tennessee is a damp ship. The amount of sickness of a preventable character is seen in the summary report for 245 days of the year 1875.

*Report of sick for 245 days of the year 1875.*

## U. S. S. TENNESSEE.

Diseases.	Admitted.	Discharged.	Transferred.	Died.	Remaining.
CLASS I.					
<i>Zymotic diseases.</i>					
Order I.—Miasmatic diseases:					
Febr. cont. simp.	2	2			
Febr. intermitt.	33	29	2		2
Varicella	1				1
Order II.—Euthetic diseases:					
Syph. primitiva	11	6			5
Syph. consec.	5	1	3		1
Gonorrhoea	18	10			8
Order III.—Dietic diseases:					
Alcoholismus	2	1		1	
Ebriositas	7	6			1
CLASS II.					
<i>Constitutional diseases.</i>					
Order I.—Diatetic diseases:					
Adynamia	32	31	1		
Rheum. acut.	47	44	1		2
Rheum. chron.	11	9	1		1
CLASS IV.					
<i>Local diseases.</i>					
Order I.—Diseases of the nervous system:					
Cephalalgia	7	7			
Epilepsia	1		1		
Insolatio	1	1			
Mania	1		1		
Neuralgia	10	9			0
Heat exhaustion	9	9			
Hysteria	1	1			
Order II.—Diseases of the eye:					
Conjunctivitis	5	5			
Odontalgia	1	1			
Order V.—Diseases of the circulatory system:					
Palpitation	1	1			
Varix	2	2			
Order VI.—Diseases of the respiratory system:					
Asthma	2	2			
Bronchitis acuta	23	22			1
Bronchitis chron.	9	8			1
Catarrhus	17	16			1
Pneumonia	2	1	1		
Hæmoptysis	2	2			
Order VII.—Diseases of the digestive system:					
Cholera morbus	8	8			
Colica	11	10	1		
Constipatio	2	2			
Diarrh. acut.	61	61			
Diarrh. chron.	3	3			
Dysenter. acut.	2	2			
Dyspepsia	9	9			
Hæmorrhoids	3	2			1
Icterus	1	1			
Tonsillitis	9	8			1

*Report of sick for 245 days of the year 1875—Continued.*

## U. S. S. TENNESSEE—Continued.

Diseases.	Admitted.	Discharged.	Transferred.	Died.	Remaining.
<i>Local diseases—Continued.</i>					
Order VIII.—Diseases of the urinary and genital system:					
Dysuria .....	3	3			
Variocoele .....	1		1		
Order IX.—Diseases of the locomotive system:					
Synovitis .....	2	2			
Order X.—Diseases of the integumentary system:					
Abscessus .....	36	36			
Adenitis .....	10	10			
Eczema .....	1	1			
Furunculul .....	42	42			
Paronychia .....	3	3			
Psoriasis .....	1	1			
Unguis involutis .....	3	3			
Ulcus .....	3	3			

## CLASS VI.

*Violent diseases and deaths.*

Order I.—Wounds, injuries, and accidents:					
Abrasio .....	2	2			
Ambustio .....	8	8			
Contusio .....	67	63	1		3
Fractura .....	4	3			1
Hernia .....	3	1	2		
Luxatio .....	1	1			
Stremma .....	11	10			1
Vuln. contus .....	27	24			2
Vuln. incis .....	9	7			2
Vuln. lacerat .....	2	2			
Vuln. punct .....	9	9			
Vuln. sclopet .....	1				1
Total .....	621	566	16	1	38

Average number of ship's company .....	507
Total number of sick-days .....	4,810
Daily average of patients .....	20.45

The gun and berth decks of this vessel have been washed down or holy-stoned on an average once in 31+ hours. The result is apparent now in the acute and chronic rheumatisms, adynamias, acute and chronic bronchitis, catarrhs, abscesses, and boils. The future suffering entailed upon this crew is not to be calculated. There is no necessity for this excessive use of water, although the Tennessee is a dirty ship. On the 12th of July, 1875, I had to report the filthy condition of the bilges in a letter to Capt. W. W. Low, U. S. N., commanding United States

ship Tennessee. Since that time I have not been able to make any personal inspection of the ship. During the same month some fourteen or fifteen coal-buckets of a filthy mixture of oil from the engines, coal-dust, bilge-water, and other refuse were removed from the bilges. An inspection of the vessel, according to General Order No. 192, October 24, 1874, was had at the navy-yard, New York, previous to our sailing, but I am not aware that it was made before the stowage of the holds. I do know that the Tennessee is not "arranged that access may be had to the spaces below the fire-room floor, the magazine-floor, chain-lockers and tank-floors, and floors of the forward and after holds." In the Naval Regulations for 1870, paragraph 941 is explicit: "As cleanliness, dryness, and (ventilation) pure air are essential to health, the commanding officer is to use his utmost endeavor to secure each in the greatest degree possible."

I trust to see in the new regulations one that prevents the wetting of all decks below the spar-deck but once a week, and orders the lacquering of the berth-deck in all vessels. Cleanliness can be preserved without the eternal morning order to "wash down decks." It would soon be ended did the order apply to the cabins. I trust to see a code of sanitary regulations like those proposed by Medical Inspector A. L. Gihon, U. S. N., engrossed in the new regulations of the Navy.

As the *morale* of men is closely associated with their *physique*, I beg to append a few opinions regarding discipline as affecting the hygienic influences upon men. A well-disciplined crew, in the true acceptance of the word, is a healthy crew. With most commanding officers in the Navy the term "discipline" means discomfort, and is synonymous with discontent. So well known is this that, when a crew is spoken of as "a well-disciplined crew," most naval officers sneer, knowing that in nine out of ten instances it is but the refracted name for that petty tyranny in a commanding officer which can only shelter

itself in the shadow of law. I am a believer in entire mending-days, in uninterrupted meal-hours, in books and papers, or a reading-room like that on the Franklin when under the command of the present Rear-Admiral C. R. P. Rodgers; in the distribution of prizes for the best drilled company or gun's crew, in excellence in gymnastics, in boat-races, exercising one mast against the other, at light spars, in minstrel troupes, in regular airing of bedding, in the idea that each watch should use their own hammocks, in graded punishments, in graded crews, and in liberty on shore. I believe that men, "Antæus-like, gain strength from contact with their mother earth." I would do away with the present slow-moving machinery of summary courts-martial, referring all cases of infractions of discipline and such as are now referred to such courts, to a board of three commissioned officers, who should inquire as early as possible into the complaint, recording in a book such notes as they should deem necessary, and that graded punishments should be assigned, not as I have known during my naval life, confinement in double irons awarded alike for spitting on the deck and for grave neglect of duty. The report of offences and awarded punishments to be sent to the department monthly and the board changed quarterly. No other punishments than those narrated in the Articles of War to be inflicted, and none unless so detailed by the board. If the offence is beyond their jurisdiction, they should so state it that the case could come before a general court. Something like this system exists in His Imperial Russian Majesty's vessels.

I would grant liberty to graded men after the ship's work was over for the day, daily, when in port, and the health of the place permitted. Breaking liberty so granted to be punished as a grave offence. There was grim humor in the remark of one of the crew on the occasion of the first battalion drill on the banks at Woosung, in November, 1875: "I am glad to see

the outside of you; it's eight months since I saw it before." Yet that man was on duty then and was not undergoing any punishment. In this connection I ask leave to call attention to that section of Article XXIV, of the Articles of War, which reads "or confinement shall not continue longer than ten days, unless a further period is necessary to bring the offender to trial by a court-martial." I have known during my service of men kept in irons, confined to the brig for three and four months, their health and spirits almost broken down, then tried, found guilty, and sentenced to be "confined in irons for the period of one month," that being a punishment deemed adequate to the offence; the court ignoring, and not taking into account as mitigating the sentence, the fact that the prisoner had already three or four months of punishment of the same character, founded upon the words "unless a further period be necessary," etc.

In many things I see the necessity for change in the sanitary condition of this ship. Her battery is considered by scientific ordnance officers a thing of the past. Men do not fight well when overmatched. The Tennessee is not a match for a small, rapidly moving gunboat with one long-range heavy rifle. Her engines are dangerous and her sanitary condition miserable.

I fail to see, and have in all my experience been unable to see, the necessity that has given rise to the venerable saw that "the commanding officer should mess alone." It is difficult to determine also the reason why, when an officer is translated from a wardroom with 338 cubic feet of air-space, his respiratory apparatus cannot perform its functions with less than 5,268, and if, perchance, he should be so fortunate as to command a squadron, with no less than 9,710. I do not perceive the necessity that keeps part of the necessary administration of a squadron unrecognized and in direct contact with the every-day routine of a single ship. I fail to see the necessity of crushing out energy, zeal, activity, and interest in the service by arrogant assumption

of the so-called privileges of position, some of which are in direct opposition to law. On the gun-deck of the Tennessee and in all flag-ships, rooms should be built for the occupation of the fleet officers, and the necessary administration of the affairs of the squadron. I would have the fleet officers removed from the wardroom and no longer officers of the flag-ship. At every naval station or place where government vessels are constructed a naval medical officer should be on duty, who would furnish such suggestions concerning the construction and building of a vessel of war as would reduce to their lowest factors all the causes in a ship (that can be so dealt with) that tend to affect the life and health of the sailor. In the future Navy of the Republic, another Tennessee I hope will never be known in structure and equipment. Her speed and model are the only recommendations. These are a few of the sanitary hints that have occurred to me in this fraction of the cruise. Should the Tennessee remain as she now is, the greatest sanitary event in her life, and the one that would occasion the most heartfelt rejoicing in a majority of her present *personnel*, will be the hour she goes out of commission.

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U. S. S. KEARSARGE.

REPORT OF SURGEON SAMUEL F. SHAW.

*Hygiene.*—The complement of officers and men has continued to be about 200, and the cubic air-space allowed each individual on board has been the same as per report for last year.

The percentage of sickness and mortality is exhibited in the subjoined aggregate report of sick for the year.

As to ventilation, lighting, and means for warming the ship, reference is made to last report.



*Aggregate report of sick for the year ending December 31, 1875.*

Diseases.	Remaining from last year.	Admitted.	Discharged to duty.	Transferred.	Continued to next year.
ZYMOTIC DISEASES.					
<i>Miasmatic diseases.</i>					
Erysipelas .....		4	4		
Febris continua simplex .....		1		1	
Febris intermittens .....	1	30	30		1
Variola .....		3		3	
<i>Enthetic diseases.</i>					
Syphilis primitiva .....		18	17		1
Syphilis consecutiva .....		6	5	1	
Gonorrhoea .....		8	8		
<i>Dietic diseases.</i>					
Alcoholismus .....		4	4		
Delirium tremens .....		1	1		
Ebriositas .....		1	1		
CONSTITUTIONAL DISEASES.					
<i>Diathetic diseases.</i>					
Adynamia .....		8	1	7	
Podagra .....		1	1		
Rheumatismus acutus .....		3	3		
Rheumatismus chronicus .....	1	19	20		
PARASITIC DISEASES.					
Verues .....		1	1		
LOCAL DISEASES.					
<i>Diseases of the nervous system.</i>					
Cephalalgia .....	1	11	12		
Epilepsia .....		1	1		
Neuralgia .....		4	4		
Torticollis .....		1		1	
<i>Diseases of the eye.</i>					
Amaurosis .....		1		1	
Ophthalmia .....		1			1
<i>Diseases of the ear.</i>					
Otorrhoea .....		1	1		
<i>Diseases of the respiratory system.</i>					
Bronchitis acuta .....		32	32		
Bronchitis chronica .....		1	1		
Catarrhus .....		4	4		
Phthisis pneumonica chronica .....		3	2	1	
Pleuritis .....		1	1		
Pneumonia .....	1	4	2	3	

*Aggregate report of sick, &c.—Continued.*

Diseases.	Remaining from last year.	Admitted.	Discharged to duty.	Transferred.	Continued to next year.
<i>Diseases of the digestive system.</i>					
Cholera morbus .....		1	1		
Colica .....		8	8		
Diarrhoea acuta .....		60	60		
Dysentery acuta .....		17	17		
Dysentery chronica .....		2		2	
Hæmorrhoids .....		6	6		
Icterus .....		2	2		
Tonsillitis .....		3	2		1
<i>Diseases of the urinary and genital system.</i>					
Cystitis .....		2		1	1
Orchitis .....		24	24		
Hydrocele .....	1		1		
Urethra strictura .....		2	2		
<i>Diseases of the locomotive system.</i>					
Ankylosis .....		1		1	
Periostitis .....		4	4		
Synovitis .....		1	1		
<i>Diseases of the integumentary system.</i>					
Abscessus .....		3	1	1	1
Adenitis .....	1	7	8		
Anthrax .....		3	3		
Furunculus .....	1	19	19		1
Herpes .....		1	1		
Paronychia .....		3	3		
Pemphigus .....		1	1		
Pernio .....		2	2		
Ulcus .....		1	1		
VIOLENT DISEASES AND DEATHS.					
<i>Wounds, injuries, and accidents.</i>					
Abrasio .....		4	3		1
Contusio .....	1	23	24		
Luxatio .....		2	1	1	
Struma .....		9	9		
Vulnus contusum .....		16	16		
Vulnus incisum .....		2	2		
Vulnus sclopetarium .....		1			1
Total .....	8	403	378	24	9
Average number of persons .....					200
Number of sick-days .....					5,361
Daily average of patients .....					9.54

*Lumbar abscess.*—George Message, seaman, age 27, native of England.

March 1, 1875.—At Hong-Kong, China. He states that three

or four days ago he bruised right heel while exercising with great guns.

*March 3.*—Slight discharge from contusion. Ordered catapl. lini sem.

*March 7.*—Foot well; complains of pain in right lumbar region. Ordered dry cups.

*March 8.*—Erythematous eruption over body, arms, and legs, not on face, no itching; slight pain in shoulders and loins; dizziness in night; says he has never had chancres. Ordered hydrag. c. corr., gr.  $\frac{1}{16}$ , potass. iodid., gr. v, ter die.

*March 10.*—Eruption also on face; pain in eyes and right loin; soreness in limbs.

*March 11.*—Eruption nearly disappeared.

*March 15.*—Pain in back and shoulders. Ordered potass. iodid., gr. x, ter die.

*March 22.*—Pain in right sacral region and in right shoulder; pulse 96.

*March 25.*—More pain and stiffness in right sacral region and right shoulder; right thigh slightly flexed; tender spot on right shoulder blade. Ordered potass. iodid., gr. xv, ter die, et linimentum ammoniæ.

*March 28.*—Pains more severe.

*March 29.*—A painful swelling on dorsum of right scapula; walks lame; thigh flexed; fold of right buttock obliterated. To continue.

*April 2.*—Same pain in right loin and in scapular swelling; wandering pains in abdomen; bowels constantly constipated.

*April 3.*—Extreme tenderness on pressure along crest of ilium; pain in right leg on walking; weak and anæmic.

*April 10.*—Pain and tenderness around right iliac crest; pulse 48. Ordered tinc. opii, m. xxx, vespere.

*April 11.*—Pain and soreness and slight swelling about right iliac crest; pulse 60.

*April 13.*—Slight swelling above crest of right ilium; tumor soft; pain and tenderness extend to right inguinal region; right thigh flexed; weakness. Ordered quin. s., gr. iii, tinc. ferri c., gtt. xx, ter die; sp. frument.,  $\text{℥iv}$ , vitelli, no. iv, lactis, O. ii, in diem; morph. s., gr.  $\frac{1}{2}$ , horâ somni.

*April 18.*—Pulse 64; redness over summit of swelling; same pains; is unable to extend right thigh; is unable to evacuate bowels unless very loose, as from a cathartic, on account of pain and soreness in right iliac region.

*April 26.*—Swelling less tender and softer; weakness; nausea from eggnogg. Ordered ale 2 pts. in day, quin. et fer. cit., gr. x, ter die, and chloral hydr., gr. xxx, vespere.

*April 29.*—Pulse 72; losing flesh and is weaker. Ordered beef essence 6 oz. and port wine 6 oz. in day; to continue quinine and iron, and chloral, gr. xxx, vespere.

*May 2.*—Abscess pointed and discharged about one quart. To continue quinine and iron, brandy and beef essence, and opium vespere.

*May 3.*—Pus yellowish, inodorous, about  $\frac{1}{2}$  pint in last day; pulse 84. To continue.

*May 15.*—Pulse 108; some thirst; bowels loose. Ordered tinc. opii c.,  $\text{℥ss}$ .

*May 17.*—Discharge about one ounce in day; is able to extend thigh more; right leg weak; to continue quinine and iron.

*May 24.*—Transferred to Saco for passage to hospital at Yokohama.

*June 15.*—Returned from hospital for duty; some inability of right thigh and weakness in right loin remaining.

*September 28.*—Abscess reforming at site of former one in right loin. Has been able to do his duty as a seaman since return from hospital, but says right loin "has never been properly well."

*October 1.*—Abscess reopened in night and discharged a few ounces of pus.

*October 2.*—Discharged to duty.

*Commentary.*—The abscess in this case appears certainly to have been confined, at the outset, within the sheath of the right psoas muscle; the semiflexion of the thigh and state of the parts about the hip, resembling that in hip disease, was clearly due to the contracted and rigid condition of the inflamed muscle and sheath. The inodorous and healthy state of the escaping pus showed that no bone was ever involved. It is conjectured that the inflammation and subsequent suppuration within said muscular sheath may have been due to some unusual strain of the muscle, probably at the time foot was injured while exercising with the great guns. The erythema and scapular swelling are believed to have been mere coincidences.

### *Climatology.*

*Maximum, minimum, and average monthly pressure.*

Month.	Maximum.	Minimum.	Average.
1875.			
January .....	30. 35	29. 74	30. 10
February .....	30. 27	29. 81	29. 94
March .....	30. 06	29. 60	29. 81
April .....	29. 93	29. 58	29. 78
May .....	29. 94	29. 46	29. 75
June .....	29. 91	29. 18	29. 64
July .....	29. 82	29. 18	29. 58
August .....	30. 20	29. 48	29. 75
September .....	30. 18	29. 80	29. 98
October .....	30. 35	29. 86	30. 12
November .....	30. 48	29. 94	30. 19
December .....	30. 34	29. 74	30. 12

*Maximum, minimum, and average monthly temperature.*

Month.	Maximum.	Minimum.	Average.
1875.	°	°	°
January .....	57 F.	27 F.	41 F.
February .....	68	34	56
March .....	80	53	75
April .....	88	56	72
May .....	78	56	69
June .....	87	64	72
July .....	89	62	76
August .....	90	66	81
September .....	84	63	72
October .....	70	51	61
November .....	63	31	48
December .....	59	35	48½

*Maximum, minimum, and average monthly humidity.*

(Wet-bulb thermometer.)

Month.	Maximum.	Minimum.	Average.
1875.	°	°	°
January .....	56 F.	26 F.	40 F.
February .....	67	32	56
March .....	86	53	74
April .....	80	55	70
May .....	78	57	68
June .....	85	63	71
July .....	92	62	77
August .....	88	65	79
September .....	82	62	70
October .....	67	48	60
November .....	62	31	46
December .....	57	34	47½

For the better understanding of the preceding meteorological tables, the location of the ship during the year is subjoined :

From—	To—	Location.	From—	To—	Location.
1875.	1875.		1875.	1875.	
Jan. 1	Feb. 6	At Shanghai, China.	June 14	July 10	At Yokohama.
Feb. 6	Feb. 12	On way to Hong-Kong.	July 10	July 13	On way to Hakodadi.
Feb. 12	Mar. 13	At Hong-Kong.	July 13	July 17	At Hakodadi.
Mar. 13	Mar. 19	On way to Manila.	July 17	July 20	On way to Yokohama.
Mar. 19	Mar. 29	At Manila.	July 20	July 31	At Yokohama.
Mar. 29	Apr. 3	On way to Hong-Kong.	July 31	Aug. 4	On way to Nagasaki.
Apr. 3	Apr. 7	At Hong-Kong.	Aug. 4	Aug. 20	At Nagasaki.
Apr. 7	Apr. 8	On way to Canton.	Aug. 20	Aug. 23	On way to Chefoo.
Apr. 8	Apr. 21	At Canton.	Aug. 23	Aug. 27	At Chefoo.
Apr. 21	Apr. 23	On way to Hong-Kong.	Aug. 27	Aug. 29	On way to Newchwang.
Apr. 23	May 1	At Hong-Kong.	Aug. 29	Aug. 31	At Newchwang.
May 1	May 10	On way to Nagasaki.	Aug. 31	Sept. 3	On way to Chefoo.
May 10	June 4	At Nagasaki.	Sept. 3	Dec. 1	At Chefoo.
June 4	June 8	On way to Kobe.	Dec. 1	Dec. 4	On way to Nagasaki.
June 8	June 12	At Kobe.	Dec. 4	Dec. 31	At Nagasaki.
June 12	June 14	On way to Yokohama.			

*Medical topography.*—The underlying rock of Chefoo and vicinity is granitic, and the soil is of course the same, more or less decomposed. The foreign settlement is situated on an isthmus of sand and a small hill of rotten granite, and the native town is adjacent to the westward, on a plain surrounded by hills on the west, south, and east. A sand beach extends some two miles to the eastward of the settlement, on which are two or three hotels and several private houses for summer visitors. The water of Chefoo is obtained entirely from wells, and contains much salt, lime, and organic matter. The water from the wells on the isthmus generally contains about 58 grains of solid matter to the gallon. One well on the hill contains only 19 grains of solid matter to the gallon. Wells in the native town contain less saline matter, but more organic. Water in wells outside of the town is much better. All shore water offered was condemned as unfit for use on board this ship. The native population of Chefoo is about 5,000, and the foreign something less than 200, with about 500 summer visitors from the southern ports for change of climate and sea-bathing. Foreign residents are mostly either connected with commercial houses or hold public offices in the customs, or are missionaries. The natives mostly obtain a livelihood by cultivation of the soil, the level land about the town being all under cultivation, and the surrounding hills extensively terraced. Cheap silks are manufactured to some extent, and bean-cake, which is shipped to the south of China to fertilize rice-fields. Some 500 foreign-built sailing-vessels and steamers call here annually, and the native junks must be many times that number. In the native town the streets are narrow and filthy. The drainage is entirely on the surface, and under a summer's sun the streets emit fearful odors, as in most other Chinese cities. The only hospital in Chefoo belongs to the Medical Missionary Society,

and is designed only for natives. It has three wards, one of which is for females. It contains about forty beds, is rudely and scantily furnished, but good enough. The bedsteads are of iron, with bamboo mats and a blanket for bedding. Ventilation is only by means of the windows and doors. The inmates average about ten, and there are three or four times as many out-door patients.

Leprosy is not uncommon in Chefoo, though less frequent than in South China. Venereal diseases are common, but mild among the natives, who have no intercourse with foreign sailors. Secondary syphilis generally follows chancres contracted by sailors and Chinese who frequent places open to both. Cholera visited this place twice in the last fifteen years. First epidemic carried off many of the foreign population. Both outbreaks occasioned frightful mortality among the natives, and swept from Canton to Peking. The native treatment for collapse is to pierce the tendons with long needles. Small-pox prevails in the towns around during the winter months, as it formerly did in Chefoo before the foreign physicians introduced vaccination, which the native doctors have now taken up and practice extensively in place of their previous universal custom of inoculation. Vaccination was first practiced freely in Chefoo in 1865, and for several years past no cases of small-pox have occurred. The mortality from small-pox among the natives is immense. Measles are very common in Chefoo, and often malignant. Scarlatina is almost unknown. Well-marked cases of ague are rare, but typhoid and typhus fevers, with an evident malarial complication, are not uncommon, especially in the summer and autumn months. Severe cases may be delirious and have an eruption of rose-colored or mulberry spots. Profuse sweating may occur at the crisis, and intestinal hemorrhage in some cases. Diarrhoea and dysentery occur, especially in the autumn, the latter being often obstinate and fatal. Pneumonia



is rare, exceedingly so; pleurisy is frequent; chronic bronchitis almost the rule in middle-aged and elderly people; muscular rheumatism is common. Dyspepsia is the rule among the natives. A light wine, made from the millet, is drunk at meals. Lumbricoids are abundant, but tæniæ are seldom met with. Women suffer much from amenorrhæa and leucorrhæa.

Sulphur-springs and baths exist at several places not far from Chefoo. One is at Loong Chuen Tang, some thirty-three miles distant in an easterly direction; the temperature of the water is about 115° Fah. These baths are highly esteemed by the natives in cutaneous diseases, especially the syphilides, rheumatism, and general debility, and are much frequented by them. A visitor states: "The sulphur-baths are in a hollow, among very high mountains. Deferring our visit to the baths till daybreak, we thought we should find them empty, but to our amazement and amusement, the square stone tanks were full of naked, pig-tailed Chinamen, packed as close as herrings in a barrel, back to back and perpendicular." The subjoined table is from the customs reports for Chefoo.

Month.	Mean maximum.	Mean minimum.
1872.		
April .....	60 F.	45 F.
May .....	75	54
June .....	78	67
July .....	87	73
August .....	83	74
September .....	77	65
October .....	66	57
November .....	54	39
December .....	46	34
1873.		
January .....	35	27
February .....	42	28
March .....	47	32

The following account of Chinese views relating to small-pox, syphilis, aphrodisiacs, and consumption, is chiefly taken from the medical reports of Dr. Dudgeon, of Peking. Small-pox and measles are recognized by the Chinese as depending upon a

poison inherited from the parents, which resides in the system until it is developed by external, exciting causes, like fire concealed in the flint. As a prophylactic, it is recommended to eat cinnabar, hare's flesh, cobwebs, etc.; against its onset beans are to be taken. In fact beans are considered an antidote against all poisons. But independent of the supposed foetal poison, the books recognize it as epidemic, depending on the air of the seasons. They enumerate five sorts of the disease, which are made to correspond with the five principal viscera of the chest and abdomen. The duration of the disease is divided into periods of seven days, one of incubation, one of development, and one of decay. The condition of the pustules and of the patient, the favorable and unfavorable symptoms are all carefully and minutely noted. In convalescence minute directions are laid down as to the contra-indications, as to eating and drinking, combing the hair, the smell of wines, spirits, etc. To preserve the eyes from the ravages of the disease, a plaster is used encircling them, the idea being to limit and prevent the pox from crossing over to them. To prevent pitting, an oil is used, with which the parts are smeared. In China, as in India, only courteous and polite language is applied to the small-pox, for fear of offending the goddess that is supposed to preside over it. It is called the "heavenly flowers," and a person suffering from the disease is said to be enjoying the felicity of the heavenly flowers. Inoculation for small-pox has long been practiced in China, by inserting in the nostrils a pledget containing the virus. Vaccination has of late years been introduced, and is now much practiced in and about the open ports. It is said the present child Emperor has been vaccinated. It is also reported that the Mikado of Japan has been lately vaccinated, and that now vaccination is to be made compulsory throughout that empire. According to native authorities, small-pox can be traced back, as having existed in China, as far as the Chan dynasty, or to about 250 B. C.

Syphilis is called yang-mei, from a fancied resemblance of the disease to the wild strawberry. It is classed with leprosy. The symptoms enumerated are swelling, redness, moisture, ulceration, itching, and pain; it is compared to yellow beans, cotton, wool, purple grapes, to the air-bladder of fishes, and each of these resemblances made to tally with the viscera. The remedies used are calomel, cinnabar, and realgar, the first-named entering into every recipe. Prescriptions are given to drive out the poison of the calomel after it has effected a cure, and here is used a drug of the sarsaparilla class. Salivation is believed to be the poison of syphilis flowing out. Calomel has been in use for this disease for the last two thousand years. Not only are preparations of mercury used, but fumigations and mercurial-vapor baths, local and general, are detailed in the books as having been in use from time immemorial. To remove syphilitic blotches, alum and rhubarb, in equal parts, mixed with water are used externally. The syphilides are considered to be not so much a further development of the disease as of the mercury taken.

Aphrodisiac remedies are much sought for by the Chinese, especially by the upper classes. The native practice in this, as in other respects, is strictly homœopathic; things in nature, from their resemblance to things in man, being prescribed; as, for example, in disease of the testes, walnuts are ordered. A noted aphrodisiac prescription is called the "three all-powerful pills," or "three genital or divine pills." The penis of the dog, ass, and deer are much valued, possessing the properties, respectively, of hardness, length, and strength. The buck is said to be able to discharge his duty to the doe more than one hundred times consecutively, after which the doe seeks out a certain plant, called the "efficacious precious grass," and gives it to the buck, who, after eating it, recovers his vigor. The great object is to secure this buck and scrape his tongue, and the

extract so obtained is called "deer-tongue extract." Another remedy for preventing the advance of debility is the "pine-ceiling dew." To obtain this, a hole is dug under a fine old fir, the central root is taken, a jar of wine is placed under it, and under this again a fire; the alcoholic fumes enter the tree with the sap, and the leaves in a few days assume a marvelous green tint. In a few days more the tree dies, and the sap on returning distills into the wine-jar. Other aphrodisiac remedies are cloves, testicles of the deer and sea-dog, aconite, and flesh of sparrows.

Consumption is not an uncommon disease among the Chinese. It is considered infectious, the belief being that, at the moment of death of the phthisical patient, a worm is expelled, which enters the body through the breath of those in attendance. To stamp it out, therefore, the patient, while still alive, is put into a coffin, buried, or thrown into the river, and so infectious consumption is warded off the surviving members of the family. The oil of various kinds of fish, especially of the shad, is used in the treatment of consumption. The cod is unknown in Chinese waters, and no oil is obtained from the liver of fishes. The following case is told, where the coffin of a consumptive patient was thrown into the river and was carried down its current, but accidentally being seen by a fisherman, who heard a noise proceeding from it, it was drawn on board. On opening it a beautiful young woman was found, who was put into the cabin and fed on fish oil. Her disease was cured, and she afterwards became the wife of the fisherman. But whether or not they lived happily ever afterwards the chronicler does not relate.

## U. S. S. MONOCACY.

## REPORT OF ASSISTANT SURGEON EZRA Z. DERR.

*Hygiene.*—During the past year the complement of officers and men has averaged 150.

The cubic feet of air on berth-deck may be approximately stated at 10,692 feet, which allows about 77 cubic feet of breathing-space for each man, placing the number of men who sleep on berth-deck at 140. During the summer months comparatively few remain on the berth-deck over night, the majority sleeping on the spar-deck under awnings, or under the hurricane-deck.

The cubic feet of air in wardroom country, is about 3,780 feet, which, divided among 10 officers, allows each 370 feet breathing-space, exclusive of his state-room, which affords him 480 feet more.

During the first quarter the daily average of sick was  $3\frac{1}{10}$ ; second quarter,  $2\frac{1}{4}$ ; third quarter,  $3\frac{1}{2}$ ; fourth quarter,  $3\frac{1}{2}$ , which, in the aggregate, makes a daily average of about  $2\frac{3}{4}$  patients during the year.

No deaths have occurred on board this ship since I have been on board.

The berth-deck is ventilated by three hatchways and twelve ports. The hatchways are, respectively, 6 feet 2 inches by 5 feet 2 inches, 3 feet 2 inches by 4 feet 6 inches, 6 feet 2 inches by 5 feet. If we assume atmospheric diffusion at 10 feet per minute, 9,230 cubic feet of pure atmospheric air would be passing every minute to the berth-deck, exclusive of that furnished by the port-holes.

Wardroom is ventilated by two hatchways and nine ports. The hatchways are, respectively, 6 feet 8 inches by 3 feet 6 inches, 5 feet by 3 feet, which would allow 4,600 cubic feet of

air every minute, assuming the rapidity of atmospheric diffusion as before.

The hatchways allow the admission of abundance of light, even when the awnings are spread.

The cabin is heated by a grate, and the wardroom and berth-deck by steam.

Distilled water has been used on board throughout the year, except during a few weeks last summer while lying at Nagasaki. The water at this place is comparatively pure, and generally used.

When lying in port the men are allowed fresh provisions every day. At sea they are supplied with sea provisions. The food is examined every meal, before the men are allowed to touch it.

Every man is compelled to have two complete suits of blue, and the same of white. In addition to the above required outfit, the men have provided themselves with overcoats, monkey-jackets, and other articles in which they have consulted their own convenience and comfort. Those who have manifested any tendency to diarrhœa or dysentery have been recommended to provide themselves with an abdominal flannel band, and those so advised have not failed to provide themselves accordingly.

From the percentage of sickness during the past year it will be seen that the health of this ship has been excellent. No pains have been spared to keep the ship in the best possible condition. The bilges are thoroughly cleaned and disinfected at least once a week. During the summer season, when the men will sleep about on the decks, the awnings are spread, to protect them from climatic and miasmatic influences.

The crew have all been pretty well protected by vaccination.

*Medical topography.*—The United States ship Monocacy was lying at anchor in the harbor of Yokohama, when I joined her on the 29th day of January, 1875. The city of Yokohama,

situated on the eastern coast of the island of Nippon, lies in latitude  $35^{\circ} 26' 11''$  north, and longitude  $139^{\circ} 39' 20''$  east, and its general direction seems to be about north and south. A number of canals, constructed for the purposes of traffic, intersect it in every direction. By far the greater part of the city lies on a flat, elevated but a few feet above the level of the bay at high tide. To the northwest of the city large rice-fields extend back into the country for several miles. These fields are flooded for a greater part of the year, and, as a natural consequence, vegetable decomposition is going on almost constantly. It is to this that the prevalence of the malarial fevers must be attributed. These causes are of course more active during the summer and autumn than at any other season. The southeastern part of the city is the foreign concession, and is backed by a high bluff, which is now pretty well covered with the houses of foreign residents. The rainy season is not very well defined, though it is generally considered as commencing about the 1st of May and lasting till the latter part of June or the 1st of July. The thermometer ranges from about  $20^{\circ}$  Fah. to about  $95^{\circ}$  Fah. during the year. These figures represent about the average.

The water, as a rule, contains more or less organic matter and salts, though comparatively pure water can be had.

During the summer and fall the periodical and continued fevers prevail extensively. Small-pox is also present during the winter months in a greater or less degree. During the winter of 1875 the disease raged in Yedo and Yokohama, and many foreigners fell victims to it. Five cases occurred on board this ship. Syphilis and venereal diseases of all kinds abound. I am informed that the Japanese were ignorant of the tertiary forms of syphilis previous to the advent of foreigners.

The United States Naval Hospital probably possesses the healthiest location to be found in Yokohama. Its elevated

position, over 100 feet above the level of the city, not only commands an excellent view of the city, but also exempts it almost entirely from the miasmatic influences which abound on the flats below.

The Yokohama General Hospital also enjoys a fine location, and is but a short distance removed from the former. This hospital is supported by private contributions furnished by the foreign residents of Yokohama. It can accommodate fifty or sixty patients, possibly more.

The Japanese General Hospital is situated on a commanding hill in the northern quarter of the city, and enjoys the same advantages of location as the two former. This is under the superintendence of Dr. Simmons, an American physician, long resident in the East. I endeavored to obtain from him some data with regard to the number and variety of the cases treated annually, but he was unable to furnish me with any accurate statistical information.

We left Yokohama for Kobe on the morning of the 7th of June, 1875.

*Kobe.*—Kobe, next to Yokohama, the largest European settlement in Japan, is situated in the Gulf of Osaka, and lies in latitude  $34^{\circ} 30'$  north, longitude  $135^{\circ} 25'$  east. The city is backed by a range of low mountains running nearly north and south. The country between this range of mountains and the gulf is highly cultivated and very fertile.

The climate is said to be moderate throughout the year, and never reaches the extremes of heat or cold. The rainy seasons is not very well defined, though it is generally considered as commencing in June and lasting till about the middle of August. Typhoons are rarely experienced; high winds are of frequent occurrence.

The water is much superior to that obtained at Yokohama, containing more salts, but little or no organic matter.



The periodical and continued fevers are met with, but do not prevail so extensively as they do in Yokohama. Small-pox is rarely if ever epidemic. Venereal diseases abound. I am informed that goitre prevails to some extent among the natives.

The Japanese have quite a large hospital here, superintended by a European physician. The vast majority of the cases treated here are cases of venereal.

On the 27th of June we sailed from Kobe, *en route* for Nagasaki, arriving at the latter place on the morning of the 30th.

*Nagasaki.*—Nagasaki, one of the five imperial cities of Japan, is situated on the northeastern side of the harbor of the same name, in latitude  $32^{\circ} 44'$ , longitude  $129^{\circ} 46'$ . The site of the city itself is level, and is completely surrounded by high hills, which are tolerably wooded at their base, but become bare toward their summits. The rainy season is uncertain, but generally commences about May; lasts till July. During the past year beautiful weather prevailed during the months of August and September. It rained almost incessantly during these two months the previous year.

The temperature of Nagasaki is moderate, never reaching the extremes of either heat or cold. The moderate climate of Nagasaki during the winter is doubtless due to the presence of the Japanese current, which bathes the southern shore of all these islands.

The water is very good, and is about the best to be found in Japan.

Malaria prevails to a very slight extent, and what there is chiefly originates in the large rice-marshes to the north of the harbor.

Small-pox is not frequent. Venereal disease prevails more extensively than in any other city of Japan that I have seen.

There is quite an extensive Japanese hospital, under the charge of Dr. Van Laren, a Dutch physician. The hospital

is situated on an eminence overlooking the city and harbor, and in a sanitary point of view its site is well chosen.

The peculiar disease, "beri-beri," prevails here quite extensively during the summer and spring. Dr. Van Laren very kindly allowed me to see the cases he had under treatment in the hospital. The majority of these cases only complained of pain about the legs, especially in the calf; in all there was more or less anæsthesia of the surface. Several had œdema of the lower extremities; and all were anæmic and broken down. As the doctor has had quite a number of cases under treatment every year, his opportunities for observing the course and peculiarities of the disease have been great. According to his experience, the disease is very rarely fatal, but it is apt to leave the patient broken in health. Although he has had several fatal cases, he has been unable to investigate the pathological lesions of the disease by *post-mortem* examination, owing to the Japanese prejudices on that point. He informs me that this disease, as far as his experience goes, prevails more extensively among sailors, and those who lead confined and studious lives, than among the lower classes, who are compelled to toil for their daily bread by muscular labor. All the cases he showed me were of the former class, without exception. He thinks the disease the result, in part, of malnutrition. The general plan of treatment pursued in these cases was tonic, iron, quinine, good nourishing diet, and a general observance of every sanitary measure. Most of the cases then under treatment were progressing favorably.

On the 25th of September we received telegraphic orders to proceed to Tientsin, China. We arrived at that place on the 30th of the same month.

*Tientsin, China.*—Tientsin is situated in the province of Pechili, on the south bank of the Peiho, sixty miles from its mouth, and lies in latitude  $39^{\circ} 10'$  north, and longitude  $117^{\circ} 3'$

east. The Peiho runs through an immense alluvial plain, which is continuous on the south with the great plain of the Hohang-ho. The Peiho, during the floods of spring, not unfrequently breaks its banks, inundating the country for miles around. During the spring and summer of 1870 an immense inundation took place which flooded the greater portion of the southern part of the province of Pechili. From its extent and the direction from which it came, it was conjectured that this great flood was caused by the Great Yellow River, or Hohang-ho, breaking its banks. This river, which formerly poured its waters into the Yellow Sea at the northern part of the province of Kiangtsu, is now supposed to empty into the Gulf of Pechili at the northern part of the province of Shantung. Its old mouth was found to be dry in 1858.

The climate of Tientsin is not very inviting at any season of the year; the extremes of temperature are experienced. During the summer the thermometer ranges over 100° Fah., whilst it not unfrequently falls below zero during the winter.

During the winter the Peiho is frozen from its mouth to its source. The river generally commences to freeze about the first week in December, and is completely blocked up by the latter end of the month. During the winter, in addition to the low temperature, dust-storms prevail to such a degree that living here during this season becomes almost unendurable. These dust-storms are supposed to originate in the great desert of Gobi, which takes up a greater part of Eastern Mongolia. This conjecture is supported by the fact that these storms only prevail when there is a northwest wind blowing.

Owing to the low, flat, and frequently marshy state of the country around, the periodical and continued fevers prevail largely. Small-pox, during the winter season, is regarded by the natives and foreign residents as a matter of course, and it frequently assumes a very grave type.

The water used is taken from the river, and contains a great deal of organic matter, which becomes a fertile source of enteric disorders. When the season admits of it, many of the foreign residents collect rain-water for drinking purposes.

There is no regular hospital at Tientsin. Nursing and bed-accommodation, however, can be had at the Catholic mission for the moderate charge of \$2 per day.

During the winter of 1875 the United States ship Palos had three or four cases of small-pox, all of which, I believe, were treated at this place.

On the 24th of November we left Tientsin for Shanghai, carrying with us the widow and the remains of our late minister, Mr. Avery.

*Shanghai, China.*—Shanghai, the largest European settlement in China, is situated in the southern part of the province of Kiangtsu, on the western bank of the Woosung, a tributary of the Yang-tse, and lies in latitude  $31^{\circ} 25'$  north and longitude  $120^{\circ} 38'$  east. The country around being alluvial in its character, is very low and flat. From the richness and fertility of the soil, this province is called the garden of the empire.

The climate is moderate, the thermometer ranging between  $20^{\circ}$  Fah. and  $95^{\circ}$  Fah. during the year. The rainfall is very great, and the rainy season generally sets in about the month of May, continuing till June or July, or even later.

The source of the water used for drinking and other domestic uses is the river; and as this contains a great deal of organic matter, it becomes a prolific source of diarrhoea and dysentery. Many persons use rain-water for drinking whenever it can be had. Light wines seem to be the principal drink among foreigners, at least with those who can afford it.

Owing to the marshy character of the surrounding country, the periodical fevers probably prevail here more extensively than in any other part of China. Small-pox occasionally occurs

as an epidemic, but very rarely. Syphilis and other venereal diseases abound.

The largest hospital, and I believe the only European one, is situated in the French concession, and will probably accommodate from 75 to 100 patients.

On the 20th of December we left Shanghai and proceeded to Ning-po-fou.

*Ning-po-fou, China.*—Ning-po is situated in the province of Che-kiang, on the north bank of the river Yung, 12 miles from its mouth, and lies in latitude  $30^{\circ} 5'$  north and longitude  $121^{\circ}$  east. The country around is flat and marshy, consisting for the most part of rice-fields. There are ranges of low, barren mountains from 15 to 20 miles distant, which hem in the plain in which Ning-po is situated. At the entrance of the river the country is quite hilly. As you proceed, the mountains recede farther and farther from the river, leaving an extensive and level plain, very rich and productive.

The climate of Ning-po corresponds to that of Shanghai in almost every particular. Owing to its proximity to the sea, the water of the river is quite salt. It is due to this that malaria is not so prevalent here as in Shanghai, which is at least 40 miles from the sea. The foreign residents do not drink the river-water, which is very impure, but obtain it from the hills, from whence it is brought by coolies.

There is no hospital in Ning-po. Those in need of nursing and medical attendance can obtain both at the Catholic mission for a moderate charge.

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U. S. NAVAL HOSPITAL, YOKOHAMA, JAPAN.

REPORT OF SURGEON JOHN W. COLES.

There are connected with this hospital a surgeon, a passed-assistant surgeon, and nine employés, viz.; an apothecary, watch-

man, two cooks, a gardener, and four coolies. In consequence of the limited number of employés, the duties assigned them differ from those performed by similar persons in naval hospitals at home. The apothecary dispenses the medicines, and gives them to the patients; he oversees the kitchen and mess-room; takes care of and issues all stores and bedding; keeps the meteorological register; acts as nurse, and attends to the general police of the hospital. The watchman acts as night-nurse and night-watchman. The cooks, in addition to cooking, set the tables and keep the mess-rooms in order. The gardener has general charge of the grounds, is gate-keeper, and does the repairs about the hospital. Two of the coolies do the cleaning and attend to sick officers and men; the other two act as laborers wherever required. The small allowance of pay for employés will not admit of the employment of a regular nurse, so convalescents are used to assist in nursing until they are able to return to duty.

The reports for the years 1873 and 1874, made by Surgeon W. M. King, and Passed Assistant Surgeon D. Dickinson, leave little to be said under the heading of hygiene.

The ventilation of the hospital is good, excepting in the ward for men in the second story of the main building. But as its windows open on a covered veranda, and to the south, it is sheltered from the north winds that prevail during the winter, and sufficient ventilation can be had by lowering the sashes without admitting much cold air. The other parts of the hospital are over-ventilated in consequence of the badly-fitting wood work. This is especially the case in the small-pox ward, a frame building elevated about two feet from the ground, the open space being only covered by lattice-work. The boards of the flooring have large open cracks, which admit so much air as to make it almost impossible to heat the ward in cold weather. This can be improved by boarding over the lattice-work, but it

is hardly necessary to do so, as the two rooms adjoining the ward, and intended for officers, will probably accommodate all the small-pox cases sent here. There is plenty of light in the daytime in every part of the hospital. At night rape-seed oil is burned, which gives an excellent light and is very cheap. Open grates were put into the ward and nearly all the rooms of the main building at the time the hospital was erected, but they were afterwards found inadequate to supply sufficient heat, and coal-stoves were substituted, and also placed in the other two wards. Wood is now being used in these stoves, excepting in the coldest weather. It is much cheaper than coal, besides being cleaner and more pleasant. The Japanese soft coal, generally used, is very dirty, produces a large quantity of ash, soon burns out the stove-grates, and clogs the chimneys with soot. When the fires are constantly burning, the soot collects so rapidly that the chimneys and stove-pipes must be cleaned almost every day, thus causing a great deal of dirt and trouble, besides danger of fire originating in the chimneys.

The water is excellent and sufficient in quantity, being supplied by a well, and collected from the roof in large iron tanks. An analysis of it has been given in previous reports.

The food for patients is in accordance with diet-tables in "Instructions to Medical Officers," excepting that chickens are substituted for mutton, as the latter is expensive and often difficult to obtain.

The clothing is the Navy uniform.

The hospital is well adapted to the requirements of the station, and will compare favorably with similar institutions in Japan. It was erected in an unsubstantial manner, but quite as well as such work is generally done by the Japanese. Nearly all of the houses in Yokohama are put up with a view to their standing from eight to ten years. The hospital is now in a fairly good condition, and will probably last that length of time if

repairs are made as required. Nearly all of these repairs can be made by the employés. It has one of the best sites in Yokohama, and is surrounded by ample and tastefully laid out grounds, containing a large number of well-selected trees, and a very pretty shaded mound, on the summit of which is a summer-house overlooking the harbor.

*Synopsis of meteorological registers for the year 1875.*

Months.	Temperature.			Dew-point.			Atmospheric pressure.				Rain-fall.
	Maximum.	Minimum.	Mean.	Maximum.	Minimum.	Mean.	Sunrise.	9 a. m.	3 p. m.	9 p. m.	Inches.
January .....	54	29	37.50	43	22	30.25	29.27	29.97	29.94	29.90	.56
February .....	51	23	37.	39	22	29.	29.96	29.97	29.94	29.97	
March .....	67	37	48.75	57	22	41.	30.02	30.02	30.00	30.02	5.98
April .....	68	39	54.50	62	30	47.	29.95	29.96	29.93	29.95	3.97
May .....	76	47	63.50	69	37	54.25	29.99	30.00	29.98	29.99	6.83
June .....	87	57	70.50	74	51	64.25	29.93	29.93	29.92	29.93	3.55
July .....	91	68	79.	79	61	71.25	29.89	29.89	29.87	29.88	3.97
August .....	87	64	77.50	77	57	71.25	29.97	29.98	29.07	29.97	7.98
September .....	83	61	71.25	76	49	64.	29.96	29.97	29.96	29.96	8.40
October .....	74	49	60.	69	33	52.	29.88	29.89	29.86	29.86	7.94
November .....	64	34	49.75	59	29	47.75	29.88	29.88	29.86	29.86	3.71
December .....	56	29	40.50	48	19	34.	29.79	29.79	29.77	29.81	2.88
Total .....											53.77

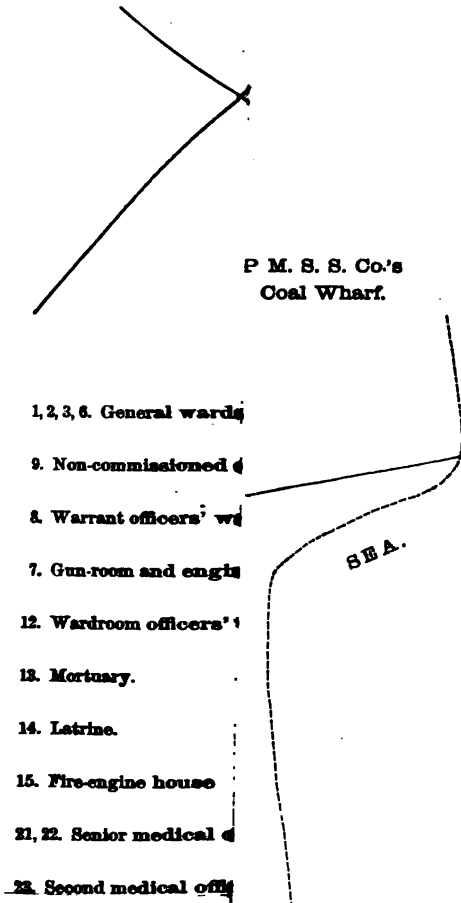
The prevailing winds during January, February, March, April, August, September, October, November, and December were northeasterly. During the other months of the year they were southeasterly.

There are in Yokohama three hospitals besides this one, viz.; the English Naval Hospital, the "General Hospital," and the Native Hospital.

Last spring the English Government removed the troops, which were here for the protection of its subjects, and has since converted the old barracks, situated between this place and the bay, into a naval hospital. Many of the buildings were torn down, and the others so arranged as to form three sides of a parallelogram, with detached buildings for commissioned offi-



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cers, small-pox ward, fever ward, administration, kitchen, store-room, carpenter-shop, and two houses for the medical officers. The small-pox ward is the house lately occupied by the colonel commanding the troops. The building for commissioned officers who are not affected with small-pox is so arranged as to give each officer from one to three rooms. The warrant officers have each a room in the large building; the other part of it is divided into four wards, 60 feet long, for men. There are a hundred beds in the whole hospital, each bed having over 1,200 cubic feet of air-space. The ventilation is by openings near the ceiling communicating with an air-channel running along and opening under the eaves. For water-closet purposes, large earthen jars are placed under the seat of the closet from an opening on the outside of the building. The heating is by fire-places and stoves.

The water-supply is from the roof, well, and a spring.

The grounds contain about five acres, are prettily laid out, and have a beautiful site overlooking the bay and settlement.

The old sick-quarters for the English fleet, at the foot of the bluff, are still occupied, as the new hospital is not quite completed. These quarters have not been visited.

The General Hospital is supported by the foreigners living in Yokohama, and is open to the sick of any nationality. It has three pavilions 60 feet long, placed parallel to each other, and connected by a building which is divided into rooms for first-class patients. The middle pavilion is used for administration, the other two have each a long ward for ordinary cases. The ventilation is by side windows, and the heating by stoves. The water-closets and washrooms, situated at the ends of the wards, are badly arranged. The hospital contains sixty beds, each having a little over a thousand cubic feet of air-space.

During the past year 165 patients were treated, 30 of whom

had small-pox. The principal diseases met with were syphilis, phthisis, diarrhœa, dysentery, and rheumatism.

The Native Hospital is under the charge of Dr. Simmons, a skillful American physician, who has had charge of it for several years. It was built for a native school, and afterwards slightly rearranged, so as to answer its present purpose. It is a two-storied structure divided into rooms, about 10 feet square, opening on halls running the whole length of the building. These rooms are ventilated by a door and window in each, and are furnished in Japanese style. Fifty patients can be comfortably accommodated, giving each a room. About 250 patients are treated yearly, half of whom receive medicine only, and are not admitted into the hospital. Those admitted into the hospital are charged 30 cents a day, which pays all of the expenses of the establishment excepting the salary of the surgeon-in-charge. The principal diseases met with are syphilis, malarial diseases, and diseases of the heart and lungs. Twenty-five to thirty students are always in attendance at the clinics, which are held every morning by the surgeon-in-charge. Some of these students are tolerably well informed and learn quickly, but, generally, they are dull, and do not represent the educated classes. Their ignorance of the languages in which medical works are written, and their poverty, are great obstacles in the way of making much progress in the study of medicine. A few medical books have been translated into Japanese. Among them are Tanner's *Practice of Medicine* and Gray's *Anatomy*. Opportunities for dissection are occasionally offered the students; criminals, who have been beheaded, being used for material.

The French Naval Hospital has been broken up.

During last winter and spring, an epidemic of small-pox took place here and in Yedo. There were over two hundred cases in this place, a quarter of which died. In Yedo the epi-

demic was much more severe and the mortality greater, which was, no doubt, owing to the fact that vaccination was made compulsory among the natives in Yokohama.

Kak-ke, or beri-beri, the disease reported so fully by Drs. Dickinson and King, still prevails in this part of Japan. Nothing new has been learned about it. A report, however, will soon be made on it by the foreign physicians living in the country, a copy of which will be sent to the bureau.



**NORTH ATLANTIC STATION.**  
**1876.**





## NORTH ATLANTIC STATION.

U. S. S. NEW HAMPSHIRE.

REPORT OF SURGEON JOHN H. CLARK.

*Hygiene.*—Complement of officers and men, 110; cubic air-space of wardroom, 7,068 feet; of state-rooms (average), 441 feet; of gun-room, 2,210 feet, with 2 ports; of gun-deck (used as the berth-deck), 43,924 feet, with 12 gun-ports and 265 square feet of hatch surface. Nearly every state-room has one gun-port. Cubic air-space of sick-bay, 6,546 feet, with 5 gun-ports. Average individual air-space on gun-deck, 578 feet; percentage of sickness, 2.00; percentage of mortality, 0.

Ventilation is abundant by means of numerous large hatches, windsails, and especially by the lateral ventilation of the gun-ports (3 feet 4½ inches by 2 feet 11 inches converted into windows), on each broadside, bow, and stern. The only difficult parts of the ship to ventilate properly are the fore hold and the spirit-room under the cock-pit. The latter is simply an air-tight box, with a small hatch above, where are stored preserved meat and vegetables in cans. The only practical way to ventilate this place in hot weather is by building a charcoal fire within. The fore hold has but one hatch, and that at the after end. Its floor is covered with closely fitting iron water-tanks, from beneath which it is impossible to remove collecting *débris*. Barrels of beef and pork are stowed on either side. In summer the temperature of the hold is so much lower than that of the outer air that a windsail, through the only hatch, produces very little circulation of air except close about the hatch itself. The bilge is accessible and readily cleaned save in the fore hold. The

ship leaks so little that the weekly application of the pumps removes but little water.

Lighting is sufficient by skylights and gun-port windows. Lard oil and tallow candles are used at night.

Warming is by coal-stoves in cabin, wardroom, gun-room, sick-bay, offices of commanding officer and paymaster and gun-deck (in addition to ship's and cabin galleys). This system is infinitely preferable on shipboard to that of steam-heaters. It is more economical, more efficient, and more healthful. The obvious objections to steam heat are, that no heat is allowed in moderately cold weather (spring and fall); that in the winter the portions of the ship heated are alternately cold and too hot; that the steam apparatus is constantly getting out of repair; and that the connecting pipes often run over or near sleeping-berths, causing sickness to their occupants.

The water is of unusual excellence, coming from a spring in sandy soil some 13 miles distant up the Beaufort River (tidal), elevated 12 feet above high water, and distant 75 feet from the river's edge. It is collected in a small tank near the spring, where sediment is first deposited, then conveyed in an iron pipe to the two lower connected tanks near the river, which hold 10,000 and 15,000 gallons, respectively. These tanks are open above and set in the sand, which constitutes their bottom. From these tanks the water is conveyed by hose into the tanks of either water-boat (1 sail and 1 steam), which are built of white cedar set in wooden hulls and holding 3,500 and 6,000 gallons, respectively, and washed whenever empty. The tanks on shore are occasionally emptied, washed, and ventilated. This water contains a small trace of sodium chloride and scarcely any organic matter, as shown by the potassium permanganate test. Contract price is 1½ cents per gallon.

The first four months the crew were supplied with fresh meat and vegetables three times a week, and the past four

months four times weekly. No effect on their health is appreciable by this change. The balance of the time the usual Navy ration has been issued. The market for fresh beef, mutton, pork, and poultry is not good; prices reasonable but quality poor. That for vegetables is better, but not varied. Fish, terrapin, and wild game are plenty and good in their season. Oysters of poor quality are abundant. Officers' messes find it to their advantage to order groceries and many provisions from New York City, whence they come, in weekly steamers, in three days. Contract price of beef is 14 cents a pound. Contract price of vegetables, 3 cents a pound.

Clothing is the usual Navy supply, of poor quality and very expensive to the sailor, whose income is so small.

*Medical topography.*—The New Hampshire is anchored, swinging to the tide, in the Beaufort River, near its confluence with Johnson's River, 4 miles below Port Royal, S. C., and 7 miles below Beaufort city, 400 yards from the western and one-half a mile from the eastern shores; in mid-channel, with a depth of water varying from 22 to 36 feet. The land is so low in all directions that the full force of the wind is felt from every quarter. This land on each side is composed entirely of islands, which supply part of the so-called "sea-island cotton" now grown in but small amount, and which are separated by tidal creeks, to which the salubrity of this station is chiefly due. The larger of these islands contain a few fresh-water ponds, but they are so small and distant as to produce no perceptible effect on the health of this ship. The summer sea-breeze adds materially to the health of this place, which is further increased by the isolation of the ship.

But three cases of malarial fever in the past eight months (the New Hampshire anchored here May 13, 1876) are traceable to this climate. For over two weeks in November and December not a single person was sick enough to be excused from

duty, and several days in the last quarter passed without a case of sickness in the squadron here. Only one case each of gonorrhœa and primary syphilis has appeared since our arrival. This exemption from venereal diseases seems due to the fact that the "liberty men" go ashore chiefly on one of the neighboring islands and visit negresses who have not yet become infected.

While precautions were taken against the entrance of yellow fever into the squadron from Savannah, Brunswick, Ga., and Charleston, S. C., where the disease prevailed last August, September, and October, scarcely any danger existed, as the disease did not reach either Port Royal or Beaufort, owing to their rigid quarantine by land, and as it could not well reach the fleet except through one of these places.

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U. S. S. ADAMS.

REPORT OF PASSED ASSISTANT SURGEON CHARLES K. YANCEY.

*Hygiene.*—The Adams was put in commission at the Boston navy-yard on July 24, 1876, being her first duty. Received a complement of officers and crew numbering 198 persons, which has since been increased to 220. About one-half of this number are boys, enlisted for training, under a recent act of Congress. The general health of the crew has been good, no contagious or epidemic diseases appearing.

The boys are not required to act as berth-deck cooks, but have been judiciously exercised on deck, in boats, etc.

One hundred and thirty persons sleep on the berth-deck, which gives each individual 110 cubic feet of air-space, not counting the space occupied by the hammocks and bedding. Seventy of the crew sleep under the forecastle, with 85 cubic feet of air-space to each individual.

The sick-bay is partitioned off from forward part of the berth-deck, and has 1,444 cubic feet of air-space. Usually not more than three persons sleep there, which gives 400 cubic feet per man. It is ventilated by two circular air-ports, 8 inches in diameter, and by the fore-peak hatch, which is 2 feet 6 inches square; the bulkhead is latticed in its upper portion, but the air coming from the berth-deck, cannot be considered as fresh air. A fixed zinc ventilator, 1 foot 1 inch by 6 inches, extends from the sick-bay through the fore-peak and fore-castle, and is covered by a fixed cap, 3 feet above the fore-castle-deck. This ventilator would be much more efficient if the fixed cap were replaced by a revolving cowl.

Twelve officers occupy the wardroom, and have 158 cubic feet of air-space to each officer. The officers' state-rooms have an average of 189 cubic feet of clear air-space.

The wardroom is ventilated by a skylight and hatch, 8 feet 9 inches by 5 feet 4 inches; five air-ports on each side, and a ventilator, 1 foot by 6 inches, leading from the pantry in rear of wardroom, through the cabin to the poop-deck.

The average daily percentage of sick has been nine one-thousandths; mortality, zero (0).

Three persons have been transferred to hospital, two of whom returned to the ship for duty.

The berth-deck is ventilated by two hatches, one measuring 6 feet by 5 feet; the other, 5 feet by 4 feet 6 inches; also, five air-ports on each side, of 8 inches diameter.

The *amount* of ventilation depends upon the force of the wind; the *means* are natural ventilation, and, in the summer time, by a windsail for each hatch, fore and aft.

Lighting is by the same means as ventilation, except at night, when the usual standing lights are used; these are lamps which burn lard oil.

The ship is thoroughly heated by steam, by means of "Wal-

ton's open-base noiseless radiators," placed in several parts of the ship. So far as the heating is concerned there is no defect, but the tubes of the radiators are "bunched," and the spaces between the tubes cannot be cleaned. It would be much better to have the tubes in a single row.

Good water was obtained at the Boston navy-yard; that purchased at Philadelphia was Schuylkill water of an inferior quality and contained a good deal of vegetable matter. At this place intestinal complaints were prevalent, which was found to be due in part to the use of Delaware River water by the ship's cook. At Norfolk the water from the navy-yard was of good quality. At Port Royal the water comes from a fresh-water spring, about six miles above Beaufort, and is of excellent quality. There is on board a "Baird's condenser," which, under a pressure of 60 pounds, is capable of producing 1,200 gallons a day; the water distilled is very pure. The tanks have a capacity of 3,200 gallons.

The food issued consists of the regulation Navy ration, with fresh meat and vegetables in port.

The clothing issued by the paymaster has been furnished by the Bureau of Provisions and Clothing, in accordance with existing regulations.

The general hygienic condition of the ship has been good; the berth-deck has been shellaced, and the sides whitewashed; this keeps it dry and free from odor. The bilges, when first in commission, were foul, but by washing, scraping, disinfecting, and keeping clean they are now in excellent condition. A quantity of bilge-water was found between the shaft-alley bulkhead and below the floors of the state-rooms on each side of the shaft-alley. This place was completely closed, and there was no way for this bilge-water to escape or be removed. In fact, it was not discovered until about one month after the ship

was put in commission. A drainage-way has been constructed, to lead from beneath these store-rooms to the keelson. The shaft-alley is on the port side of the keelson, and the bulkhead of the store-rooms on the starboard side comes out to and is perpendicular to the keelson, so that there is no way to clean the bilges aft on the starboard side except through the bottom of these store-rooms; this is very inconvenient, and should be remedied.

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U. S. S. SWATARA.

REPORT OF SURGEON EDWARD KERSHNER.

The complement of men was reduced during the year from 173 to 161. In every other respect the numbers are the same as in my last annual report, the same number of officers being now on board as at the commencement of last year. The change in number of the crew has produced a favorable change in the air-space permitted to each man. Those sleeping on the berth-deck have now a little more than 125 cubic feet of air-space each, and those under the top-gallant fore-castle have 110 cubic feet to each man.

While a little more space is thus allowed by the decrease in the number of the men under the top-gallant fore-castle, the circulation of air and admission of light have been very much interfered with by the entire closing up of one hatch, and half closing of the other, on the top-gallant fore-castle since the ship has been at this station. This change seriously interferes with the lighting and ventilation of the forward part of the berth-deck and the sick-bay. The ventilation of the ship has been poor enough heretofore, and it is with regret that I have to record the change for the worse.

The general ventilation of the ship, with the exception of the fore-castle, is the same as mentioned in my last report, but I beg

to again mention the sad condition of the steerage, where there is almost no circulation of air, owing to its peculiar construction. This defect causes great discomfort to the gentlemen occupying the steerage, especially when the ship is in hot climates.

The water-supply, food, and clothing are the same as mentioned in my last report. The water-tanks are located in the hold, and when the water is condensed the tanks are left open to facilitate the process of aeration. As all air having access to the tanks must pass through the berth-deck it must necessarily be very impure, especially in the night when most of the crew are in their hammocks. The air is loaded with all kinds of impurities, which must be absorbed by the water to a greater or less extent. A large body of hot water passed into the tanks from the condenser heats the entire hold and other parts of the ship, and keeps it heated for days at a time. A great part of the heat of the ship while on the coast of Mexico last summer, was due to this cause. I would therefore suggest that a large receiving-tank be located on the upper deck to receive the water, and hold it until cool and aerated, when it could be passed into the tanks in the hold.

The uncomfortable and unhealthy condition of the bilge of the ship, which I have several times reported since the ship has been in commission, continued to give great annoyance until the ship sailed for the Mexican coast in May last. It then became necessary that something should be done in this direction to save the ship from epidemic fever. Commander Cooke, finding all ordinary means to fail, then authorized Passed Assistant Engineer Charles H. Manning, a very capable and intelligent engineer, to remove such bulkheads and planking as should be found necessary to give access to the poisonous matter. This was almost entirely successful, a very large quantity of black, offensive *débris* being removed from beneath the port store-rooms and magazine. Since the removal of this matter there



has been very little trouble with the gases from the bilge, and by frequent washings it has been kept in good condition.

The heat, while in the tropics, under steam, has been very great and debilitating, rendering it impossible for officers and men to sleep below at times, although I believe it to be very unhealthy to sleep in open air in malarial harbors. This intense heat of the berth-deck and officers' quarters I believe to be inseparable from vessels with high-pressure boilers, unless much better means for the escape of heat from the fire-room to the open air are provided than those now existing.

I believe the health of the crew would be promoted by abandoning the white clothes now in use, and using only the white frock over a flannel undershirt, the sudden changes of temperature in hot climates tending to produce chills and congestions of the internal organs, unless the body is well protected by woolen clothes. The cap now used I believe to be injurious to health, affording very little protection to the head in the hot sunshine or bad weather.

The Swatara during the year visited successively the following places, viz: Pensacola, Fla.; Key West, Fla.; Port Royal, S. C.; Key West, Fla.; Havana, Cuba; Key West, Fla.; Rio Brazos de Santiago, Tampico, Tuxpan, Vera Cruz, Tonala, Frontera, Goatzocoalcos River, Vera Cruz, Mexico; Key West, Fla.; Port Royal, S. C.; Halifax, N. S.; Portland, Me.; Boston, Mass.; Newport, R. I.; and New York.

While cruising on the Mexican coast the weather was intensely hot, and as steam was necessarily used most of the time, the heat from the fire-room increased the discomfort. These deleterious sanitary surroundings exerted a very injurious influence on the health of the officers and crew of the ship, so that on our arrival at Key West, in July, they were so much exhausted and debilitated that it was with difficulty that the ordinary routine duties of the ship could be carried on. In this situation

the thoughtful and judicious order directing the ship to cruise on the northern coast was very opportune and fully appreciated by officers and men. It resulted in re-establishing the health of the ship's company.

The yellow fever was epidemic at Havana and Vera Cruz when the ship visited those places, but owing to the excellent sanitary measures enforced by Commander Cooke, the ship escaped the epidemic at both places.

Owing to the short time spent at each place visited, and the great difficulty of communication with the shore, no medical or scientific information of particular value was obtained.

There has been no death on board during the year, and the percentage of sickness is 2.74.

In conclusion, I would recommend that provisions for bathing and personal cleanliness be provided for the men. There are no bath-tubs for men or officers. It is not necessary to urge the propriety of having the best possible facility for personal cleanliness in this age.

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#### U. S. S. OSSIPEE.

##### REPORT OF SURGEON C. J. STUART WELLS.

New Orleans has been quite healthy thus far, January 1, 1876, for a city of its locality, character of inhabitants, etc. The winter till now has been unusually severe, with frequent cold storms and frosts. The thermometer has frequently been as low as 25° Fah., and in consequence variola has prevailed to an unusual degree, and still prevails, especially among the negroes and lower classes of creoles. The board of health endeavour to prevent the spread of this disease by universal vaccination, but only partially succeed on account of the want of necessary legislation to enforce general vaccination. There are several hospitals, pest-houses, etc., but they are poorly sup-

ported and primitive in appliances. Vaccine virus is mostly taken from a young cow and applied to young children, after which it is universally used.

At the time of our arrival, yellow fever was disappearing from the city. About twenty-five cases appeared in different parts of the city, but not epidemically, owing to the method of disinfection pursued by the board. Sustained and supported by proper legislation, it seems that this terrible disease can be effectually held in check and localized, provided the system be thoroughly carried out. The advantages of this system of disinfection to commerce are very great, as vessels coming from tropical or suspected ports are detained at quarantine only long enough to be disinfected. This is done by forcing into the holds and store-rooms of the vessel, by means of a "power-blower," for several hours sulphurous-acid gas, and by pouring into the bilges large quantities of the coal-tar acids. The vessel is then allowed to proceed to her wharf where she is again disinfected; the same process is repeated after her cargo has been discharged.

The result of this method of disinfecting has proved very satisfactory to the sanitary officers and to the commercial community; it was instituted in 1874, by Dr. A. W. Perry.

The method of isolating the cases of yellow fever to prevent its spreading, seems to have been attended with marked success. The theory adopted by the board of health here is that yellow-fever poison propagates itself rapidly, and spreads by creeping along the ground, surfaces of buildings, fences, etc., and is essentially of a stealthy nature; that it emanates from a person affected with the disease; that from this person as a focus it spreads in all directions, along surfaces, either with or against the wind, at the rate of about 40 feet per day. Hence, when a case makes its appearance, four is added to the number of days the person has been sick—the probable period of incu-

bation—and this sum is multiplied by forty; the product represents the radius to be disinfected. All streets within that radius are barricaded, and commencing at the circumference, every building, fence, street, and sidewalk is thoroughly disinfected by strong solutions of carbolic or cresylic acids. Atmospheric disinfection is not employed, as the theory is that the disinfectant must be brought in contact with the poison-producing and poisoncommunicating surfaces.

According to the report of the president of the board of health, Dr. C. B. White, recently published, this method of isolation by disinfectants has met with remarkable success. The only cases of failure during the four years of the experiment are attributed to the opposition of householders and their families to the thorough method of disinfection insisted on by the board of health.

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#### U. S. S. HURON.

##### REPORT OF SURGEON GEORGE S. CULBRETH.

The Huron is an iron vessel, recently built, and has been in commission since November 15, 1875.

The parts of the vessel occupied as quarters by the officers and crew are sheathed with wood, except overhead on the berth-deck; and in most respects the ship is well provided with skylights and hatchways, as well as air-ports.

The complement of officers and men was formerly 145, but recently has been reduced to 115 men and 17 officers, a total of 132. About 80 of the crew swing their hammocks on the berth-deck, and 35 under the forecastle.

The actual amount of cubic air-space to each man, after deducting that occupied by mess-chests, dispensary, bags, hammocks, brig, etc., is 106 feet on the berth-deck, and under the forecastle, after similar deduction, 100 feet. The starboard steer-

age, occupied by four officers, has 446 cubic feet, not including bunks and lockers, which is 111.5 feet to each officer. The port steerage consists of two state-rooms, having each a capacity of 235 cubic feet, with a single occupant. The steerage country has 1,330 cubic feet. The six officers who occupy this portion of the ship have, therefore, including the country, 561.5 cubic feet apiece. The wardroom state-rooms, nine in number, have from 207 to 235 cubic feet, and the country about 200 feet to each officer. The space occupied by the cabin is on the spar-deck, and is divided into two apartments, which are well lighted, well ventilated, and commodious, having a capacity of over 3,000 cubic feet.

Lighting and ventilation are provided for by the ordinary method of hatchways, skylights, and air-ports, and are as good, perhaps a little better, than are usually met with. Especially is this true of the berth-deck, which has 14 air-ports, with diameter of 7.375 inches closed, and 8.625 inches open, two hatchways and two scuttles, two of these openings being carried through the top-gallant forecastle. The steerage has one hatchway 5 feet square, and two air-ports on each side; but in the wardroom the ventilation and lighting were not so well provided for by the methods just mentioned, and it was left without any special provision to effect these most desirable objects. This apartment is 33 feet long, and originally had but one skylight, situated in the extreme forward part, but about four months after the vessel went in commission, authority was obtained to cut an additional skylight just abaft the mizzen-mast. This improved both the lighting and ventilation, but the extreme after part, containing, as it does, store-rooms and pantry, is still poorly ventilated, and is badly in need of a shaft running up through the poop for this purpose. There is also defective ventilation in the shaft-alley. An effort has been made to ventilate it by a space along the skin of the ship lead-

ing to an opening just below the taffrail, but it is at times inoperative and at best inadequate. This defect might be remedied by a shaft carried up through the cabin and wardroom, as suggested for the latter apartment. Trouble was experienced from the bilges in the after part of the ship soon after we reached the tropics, and two rooms in the wardroom were made almost uninhabitable by emanations from this source. On examination it was found that there was not free passage for the bilgewater which had collected under a couple of store-rooms, into the most dependent part of the bilge, and this being remedied, the nuisance was greatly abated. Still, the after part of the ship is not infrequently bilgy, due, I think, in a great measure to the defective ventilation of the shaft-alley already referred to. Under the yeoman's store-room for a distance of six or eight feet, no limber-holes were cut, but this part of the bilge is easy of access, and being limited in extent, is kept clean without much difficulty. Between the fore and mizzen masts the bilge is inaccessible ordinarily, this portion of the ship being provided with a second bottom, intended to be water-tight, and carried up along the side of the ship to the upper turn of the bilges. This portion of the bilge is thus converted into a water-tight compartment, provided at each end with gates which admit of the water outside flowing into the pump-well. Practically the water in the after part of the bilge, outside of the gates, was not entirely removed by this arrangement, and it was found necessary to make a direct connection with the pumps before this water could be entirely discharged. As is almost always the case great quantities of dirt have been removed from the bottom of the ship, which collected there while building. The importance of removing the *débris* from a ship's bottom, and thus starting her out free from such sources of contamination, is admitted by all, and the department's orders relative thereto should be rigidly enforced.

Steam-heaters are provided in the officers' quarters and on the berth-deck, which serve very well the purposes of warming. The galley is under the forecastle, and could be used for warming this portion of the vessel at night if the severity of the weather should require it.

The water used has been partly distilled and partly procured from shore. It has been invariably examined, and no sickness has resulted that could be attributed to its use. The only foreign port where water was procured from shore was Vera Cruz, and here it was found of excellent quality. It is preserved in iron tanks, four in number, with a total capacity of 3,000 gallons. There has been an average daily consumption of about 200 gallons.

The food has been the ship's rations, with fresh provisions three or four times a week, whenever practicable; besides, the ship has been in port a great deal and the men have liberally patronized the bumboats. The only restriction in the purchase and use of fruit has been to reject any that was unripe or at all decayed.

In the matter of clothing perhaps there is not so much need of changes or additions as greater care in making up what is already provided. The best-dressed men are those who make their own clothes; and those who are content with the garments as they come from the paymaster, seldom or never look neat and tidy. Personality enters largely into this, some men always looking well, and others just as invariably the other way. Lighter under-clothing would seem called for in the tropics, also hats that would protect the face from the extreme solar heat; the low shoes should be of better quality, and it would, no doubt, aid materially in preserving the health of the crew if some kind of waterproof garments, or material to make them of, were added to the present supply of clothing. This subject, as well as that of food, might be referred with advantage to a board of experienced

officers, whose recommendations would receive practical recognition by the department.

The past year has been marked by an excellent degree of health among both officers and men. Aggregate of sick-days for the year, 832; daily average of sick, 2.273; daily average per 1,000, 17.22; no deaths. Transferred on account of sickness, 8. Of these, two were transferred with chronic rheumatism, two with carbuncle, one for old age, one with dislocation and fracture, one to avoid going into ~~the~~ the tropics, having had frequent attacks of intermittent fever, and one for stricture.

The Huron has been employed the past year on our own coast and on the coast of Mexico. The month of May was spent at Vera Cruz, and the greater part of July on the coast between that city and Tobasco. We anchored off Vera Cruz April 25, distant about 1,000 yards from the mole. This city is situated on the Gulf of Mexico, in latitude  $19^{\circ} 11' 59''$  north, longitude  $96^{\circ} 8' 36''$  west, and is built on a sandy plain elevated a few feet above high-water mark. To the southward vegetation is found covering the plain with grass, cactus, and various herbs of stunted growth. These disappear as we proceed north, until nothing is seen but the bare sand heaped into elevations of considerable height, which change their position more or less under the influence of the fierce "northers." The city is enclosed by a wall from 10 to 14 feet in height, which, unfortunately, in a sanitary point of view, is in a good state of preservation. On the east the harbor is partially protected by the castle of San Juan de Ulua, built on an island, and distant from the city about half a mile. The population numbers about 13,000, of whom 11,000 live within the walls, and 2,000 just outside. The streets are well paved and have gutters in the centre which convey all the sewerage, with the exception of that from the water-closets (some of which probably escapes by them), to the sea. Fresh water is kept running in these gutters by steam-power, and



they are further cleansed by laborers, who at the same time sweep the entire streets. Still there are frequently offensive emanations from them, so much so that in the morning persons are sometimes compelled to close their windows for this reason. While efforts are thus made to keep the streets clean and convey the sewerage to the sea, there are numerous holes and corners about the city where filth and foul air abound. The city is supplied with water from the Jamapa River where water-works are located, about 15 miles distant. The water is conveyed to the city through iron pipes with the aid of steam-power. The works were completed in 1867, and by supplying the city with good water, in place of that which was formerly used, have done much to improve the health of the place. This water was examined several times during our stay at Vera Cruz, and was found almost perfectly pure. During the summer months, however, the season of heavy rains, it contains more or less foreign matter, but not enough to constitute an objection to its use. As before remarked, our supply of water while here was drawn from this source with most satisfactory results.

Vera Cruz has the reputation of being a very unhealthy city. This it has obtained more, I suppose, because of the prevalence of yellow fever than any other disease, though the pernicious type of malarial fevers has a home here and is a fruitful cause of mortality. The city was considered very healthy last spring, but the year previous a most severe and malignant epidemic of yellow fever prevailed, an epidemic with an estimated mortality of 60 to 80 per cent. of those attacked. The disease is rife during the summer and first two fall months, when it ceases to prevail as an epidemic, the remainder of the year being marked by few, if any, cases, except the month of May, which quite often marks the commencement of the disease.

Conversation with the physicians of the place failed to elicit anything new as to the causation or treatment of this disease.

I learned, however, as regards susceptibility, that the persons most liable of all to contract it are native Mexicans from the elevated table-lands of the interior, two or three hours' stay in the city during the prevalence of an epidemic having induced fatal attacks in these persons. The Vera Cruzanos escape, but it is the opinion of some physicians that many of them are exempt because of having had it while young. Negroes born in the city do not have it, but negroes coming from places where the disease does not prevail do have it, but are much less susceptible than whites. It is asserted on good authority that, no matter how severe the epidemic in the city, the disease never develops in the shipping, except in the persons of those who have exposed themselves on shore. Even during the very severe epidemic of 1875, when many sick of the disease were daily transported from the castle of San Juan to the city, though passing in close proximity to the shipping, not a case of the disease was developed in the harbor in persons who had not been on shore. From this it would seem that a strict quarantine would effectually protect a ship's company, even if lying there during a severe epidemic. Not a death was reported from yellow fever while we were at Vera Cruz, from the 25th of April to the 3d of June. The cases during that time were mild, and all recovered. But later in the season, at a little place called Santa Anna, about sixty miles south of the city, I met with two malignant cases of the disease on board a Norwegian bark, both of which had black vomit, and one of them died before we left. The other, no doubt, succumbed soon after our departure, which took place just after the death of the first one. These men had been on shore assisting in getting logs of mahogany off to their vessel. The captain was recommended to go to sea as soon as possible.

Other diseases prevalent at Vera Cruz are the various types of malarial fevers, many perishing, as before remarked, from

the pernicious variety of these fevers, its victims, as well as those of consumption, being found almost exclusively among the poorer classes. Exposure to the hot sun by day and to the damp air at night, insufficient clothing, and bad ventilation are causes constantly acting on this class of the population, inducing attacks of fever on the one hand, and pulmonary affections on the other. Children suffer greatly from spasms, have diphtheria occasionally, and many perish from *trismus nascentium*. *Cholera infantum* does not exist; pyæmia is occasionally met with in the hospitals, also puerperal fever; erysipelas is more frequent, while hospital gangrene is almost unknown. Syphilis prevails extensively, and many old ulcers are found in the hospitals, independent of its contamination. Leprosy is rare. In the month of April, 1876, there were 108 deaths in the city, and in the following month 67. The diseases were as follows: Consumption, 35; pneumonia, 12; dysentery, 9; spasms, 10; pernicious fever, 5; remittent fever, 6; fever (simply), 8; tetanus, 4; hepatic abscess, 3; dropsy, 2; chlorosis, 2; still-born, 3; diarrhœa, 3; meningitis, 4; colic, 2; organic affection of the heart, 2; cancer, 2; rheumatism, 2; purulent absorption, 2; septicæmia, 1; cerebral abscess, 1; erysipelas, 2; tabes mesenterica, 4; apoplexy, 1; peritonitis, 1; myelitis, 1; scrofula, 1; leucocythæmia, 1; pulmonary congestion, 1; cerebral congestion, 1; cirrhosis, 1. Included in the totals given above are 23 deaths from injuries of all kinds, including those among the troops, the country being at the time in a state of armed insurrection, and 13 by drowning in the harbor. By ages, there were 141 adults, 34 children, a remarkable disparity, the same thing presenting itself, though in a less degree, in the relative number of males and females, there being 115 of the former and 60 of the latter.

Of the hospitals of Vera Cruz the San Sebastian occupies the first place. It was formerly a convent, with one floor only,

but about ten years ago an additional floor was added, and the building converted into a hospital. It is in the form of a square, inclosing a patio of considerable area, a chapel occupying one of the sides of the square. The building is of brick and coral stuccoed, and is said to accommodate 500 patients. The first floor is occupied by offices, pharmacy, linen-room, kitchen, laundry, a ward for convalescents, one for insane, one for chronic ulcers, and a large bath-room. On the second floor are three or four large wards, and private apartments for the accommodation of those who may desire to bear their own expenses. The hospital has a large fund for its support, which is administered by the Junta de Caridad, and is under the immediate superintendence of a member of the medical profession. It receives male patients only, not younger than seven years, and admits all classes of diseases, not excepting the insane, a most objectionable feature, bad alike for these unfortunates and the other occupants of the building. While the means seem to be at hand to provide for the comfort of the sick within its walls, certain defects of management are plainly visible. The wards on the second floor all seem too large, having 100 or more beds; the windows are too small, and not sufficient in number; close stools are used in lieu of water-closets, and the odor from them was plainly perceptible; the quarters for the insane were in an offensive state of uncleanness, contrasting markedly with other parts of the building, which were clean and neat, though the air was not sweet, as before noted. There is one large bath-room on the first floor, for the entire building. It is provided with six fine stone tubs, with hot and cold shower-baths. The kitchen is large and apparently well ordered, the linen-room well stocked with bedding, much of which has never been used, and at the pharmacy most of the pharmaceutical preparations are made. The hospital was singularly deficient in surgical

instruments, those shown me constituting a beggarly array at best.

The Military Hospital will accommodate about 300 patients. It might more properly be denominated sick-quarters, for it possesses few of the essentials of a modern hospital establishment. The building was formerly the property of the church, and not intended for its present use. It is poorly lighted, poorly ventilated, and poorly equipped, and deserves only a passing notice.

The woman's hospital, *Hospital de Loreto*, is under the intelligent supervision of Dr. Molino, by whose courtesy and that of the American consul, Dr. S. T. Trowbridge, I was enabled to visit these different institutions. This hospital has accommodations for about 50 patients, and provides well for the comfort of the unfortunate persons who occupy its wards. The sick are treated on the second floor. The wards are neat in appearance, though not so well lighted and ventilated as could be desired. A supply of modern instruments had just been received, and the capacity of the building was being enlarged at the time of my visit, showing that the hospital is doing a good work, and is appreciated in this substantial way by the people of the city.

I regret that I was unable to procure any reports of these different institutions. The custom of making an annual report, as in most institutions of a public nature in our own country and in Europe, does not seem to be observed in Vera Cruz, hence there were no reports to be obtained.



**EUROPEAN STATION.**





## EUROPEAN STATION.

### U. S. S. VANDALIA.

#### REPORT OF SURGEON GEORGE H. COOKE.

*Hygiene.*—Complement when ship was placed in commission : Officers, 27; men, 207; total, 234. Present complement of officers, 30; of men, 161; total, 191. Among these the air-space is distributed as follows :

Part of ship.	No. of persons.	Total cubic feet of air-space.	Cubic feet to each person.
Top-gallant fore-castle .....	45	4,890	108 +
Sick-bay (average) .....	4	1,484	371
Berth-deck .....	116	18,391	158 +
Warrant officers' rooms, each .....	1	260	260
Steerage country .....		1,186	
Starboard steerage .....	7	1,100	157 +
Port steerage .....	5	1,100	220
Wardroom country (officers and servants) .....	18	8,930	218 +
Wardroom state-rooms, each .....	12	3,336	278
Cabin .....	1	5,069	5,069

Percentage of sickness, 72.41 of complement; percentage of mortality, 1.36 of admissions; percentage of mortality, 1.01 of complement. Both deaths were by violence, one being by drowning in the effort of the man while a prisoner in irons to escape from the ship. The other death was by poison, aconite, contained in a liniment which the man drank to procure intoxication, in the belief that there was alcohol in the mixture.

The ventilation of the cabin is all that could be desired. The fore-castle, when the entrance is not closed by a curtain, and its scuttle, forward of the foremast, and skylight are left uncovered, is practically open to the outer air. Added to this, in fair

weather and in port, is the further ventilation gained by opening the two bridle and two unfilled gunports.

The wardroom is ventilated by means of a hatch 5 feet 5 inches by 5 feet 9 inches; a forward skylight 5 feet 9½ inches by 4 feet 10 inches; an after skylight 4 feet 4 inches by 3 feet 5 inches opening on the poop by means of a shaft leading through the cabin, and having windows in its forward bulk-head opening under the break of the poop; and in the pantry a ventilator 11 inches in diameter, opening by means of a copper funnel on the poop. There are also two air-ports in the pantry and one in each state-room, 7½ inches in diameter.

Each steerage has three air-ports, and the two doors open into the steerage country, which has a hatch 5 feet 9 inches by 5 feet 5 inches leading to the spar-deck.

The warrant officers' state-rooms, two on each side, are abreast of the engine-room, and with their one small air-port each, which is always closed at sea, and the heated fumes arising from the engine-room, together with the foul atmosphere of the berth-deck, are very insalubrious, particularly at night.

The sick-bay is ventilated by means of three air-ports on each side, which are, however, kept closed at sea, and a skylight with hinged sash 2 feet by 4 feet 6 inches, which opens under the forecastle, directly under its forward hatch.

The berth-deck has five air-ports on each side and two hatches, one 4 feet 9 inches by 4 feet 10 inches, the other 4 feet 10 inches by 5 feet, both opening under the forecastle; the latter under an opening of the same size in the forecastle-deck, which, however, is sealed by having the catamaran, spare spars, etc., stowed upon it, thus obstructing the passage of the column of vitiated air from below.

There is a hatch 5 feet 10 inches by 30 feet 8 inches leading from the spar-deck to the fire-room, and another 7 feet 9 inches by 6 feet 9 inches to the engine-room. The bulkheads enclosing

these on the berth-deck have small movable sash, glazed, let into them, but these add little or nothing to the ventilation of the berth-deck, since it is found necessary to keep them closed almost constantly on account of the heat and foul odors coming up from below. As is most generally the case, therefore, the berth-deck is the most poorly ventilated part of the ship.

In addition to the large hatch mentioned above, the fire-room has also four hooded metallic ventilators,  $17\frac{1}{2}$  inches in diameter, but as they do not rise to a sufficient height above the hammock-rail to catch much wind, their usefulness is impaired from this cause.

The ship is supplied with nine windsails, which, however, can only be set when the conditions are favorable, and are distributed as follows: Sick-bay, one; berth-deck, two; fire and engine rooms, one each; steerage, one; wardroom, two; and cabin, one.

An effort was made while the ship was refitting at New York to have hooded ventilators fitted to the bunker-plates on the spar-deck in order to give additional ventilation to the berth-deck. They were promised up to the last day of our stay there, but were not put in.

The bilges are kept as clean as circumstances will permit, but portions are very difficult of access, and others are sealed by store-rooms, so that foul odors are frequently perceptible. The defect should be guarded against in the construction of the ship, for all subsequent care will hardly serve to remedy the evil.

Experience at sea having demonstrated that the ship rolled excessively, it was suggested on our return from a cruise in the Gulf of Mexico that the difficulty might be remedied by raising the ship's centre of gravity. On our arrival at New York, therefore, the suggestion was carried out by the introduction, amidships, on each side of the berth-deck, of iron coal-bunkers, of the capacity of over twenty tons each. The improvement

was effected at the expense, to the salubrity of the berth-deck, of four air-ports and 1,584 cubic feet of air-space. No perceptible diminution of the ship's rolling has, however, been observed, and the coal contained in the bunkers having been consumed, they are now used as store-rooms for material not otherwise provided for.

Parts of the berth-deck are insufficiently lighted, as is also the sick-bay. An increase in the size of the air-ports, and the insertion of bulls-eyes into the decks, at convenient places, might, perhaps, remedy the defect, in a measure at least. The artificial lighting is all that could be desired, with the exception of the officers' state-rooms. Surely some better mode of lighting these, and a more efficient substitute for the ancient tallow candle, so painful to the eyes and injurious to sight, might be devised.

The ship is warmed by means of steam-heaters, distributed as follows: Cabin, four; sick-bay, one; berth-deck, two; steerage, one; wardroom, two. In very cold weather additional warmth is obtained on the berth-deck by lighting a fire in the sheet-iron bake-oven. The ship's galley is located under the forecastle; this, when the curtain at the break of the latter is let down, renders this part of the ship quite comfortable, even in very severe weather.

The water consumed on board is obtained, whenever practicable, from shore. This, during the past year, has been of good quality, with two exceptions: that obtained during our short stay at Lisbon, Portugal, and more recently, at Smyrna, Asia Minor. At the latter port the supply of water, the product of artesian wells, was found on several occasions so loaded with chloride of sodium and ordinary earthy salts as to necessitate its rejection.

The ship is supplied with two ordinary double-worm distillers, of a capacity of 2,000 gallons daily, which with care, and

in good weather, work well, furnishing potable water. There is also on board a Baird's distiller, but I am informed that it is never used, since, by reason of its improper location in the fire-room, the air supplied to it for aeration is so impure as to render the water it furnishes unfit for drinking purposes. The ship's water-tanks, of iron, have a capacity of 6,126 gallons. Daily consumption about 250 gallons for all purposes. During the greater portion of the time since our departure from New York, September 11, officers as well as crew have been subjected to an allowance of water at about the following rate daily for all purposes, culinary, washing, and drinking: Ward-room officers,  $2\frac{1}{2}$  gallons; other officers, 2 gallons; crew,  $1\frac{1}{2}$  gallons each. This necessitated strict economy in its use, and officers were compelled, in order to obtain sufficient for bathing, to save their surplus from day to day, to catch rain-water, etc., the quantity furnished each room being from 3 to 4 quarts daily. The average cost of the water distilled on board during the past year has been about  $1\frac{1}{4}$  cents per gallon.

The ordinary Navy ration, ample in quantity and of good quality, has been furnished, together with a liberal supply of fresh provisions when in port. Added to these, monthly issues of money have been made, and every reasonable facility afforded the men for supplying themselves from the bumboat, and for carrying fresh food to sea.

There was furnished the ship for issue an article of desiccated potatoes, cut in slices, put up by the National Preserving Company, of Baltimore. Also, a supply of "evaporated onions," prepared by the Alden Pneumatic Preserving Company, of New York. Both these articles have proved failures on board this ship, notwithstanding every effort has been made by repeated trials and by varying the mode of cooking and serving to render them palatable and fit for eating. The dried apples, prepared by the Alden pneumatic process, on the contrary, are

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very good, have proved an acceptable and excellent article of diet, and are far superior in every respect to the dried apple formerly supplied our ships.

The clothing furnished has been of the usual style and quality. The only complaint made has been on the score of high prices.

The sanitary condition, the comfort and convenience of officers and crew, and, consequently, the economy and efficiency of our ships might be improved and enhanced were the following suggestions, most, if not all, of which have, no doubt, been heretofore mentioned in the reports of medical officers, carried out :

All air-ports should be enlarged in order to permit the admission of an increased supply of air and light. And in order to facilitate the dispersion of the latter, when the port is closed, the glass should be convex externally and prismoidal on its in-board face.

Whenever practicable, bulkheads should be latticed instead of solid. Those in the wardroom, and other more conspicuous parts of the ship, might be fitted with ornamental malleable-iron panels.

Venetian blinds should be introduced, in lieu of curtains, in the wardroom and steerages.

All hatches and skylights should, where practicable, be fitted with canopies, impervious to water, at such heights above the coamings as to insure greater ventilation below decks during foul weather.

All doors, instead of opening on hinges, should, where such an arrangement is possible, be built to slide into the bulkhead.

The pantry should be constructed outside of the ward-room.

The state-rooms should be fitted with swinging bunks, convertible during the day into lounges.

In place of the expensive, cumbersome, unsightly, filth-ac-

cumulating wash-stands now in use, state-rooms should be furnished with fixed, porcelain wash-sinks, not encased, and made fast to the bulkheads. The outlets from these might be led to a common waste-pipe, and thence overboard at a convenient point through the ship's side. Above these sinks should be placed small, galvanized-iron water-tanks, fitted with stop-cocks, and removable for cleaning and refilling purposes. The advantages to be derived from this arrangement are economy, cleanliness, increased air-space, and dispensing with the old-style bowl, pitcher, and slop-pail, with their attendant disadvantages. With the officers' water-closets removed to the after part of the ship, so often recommended heretofore, all necessity for the use of the *pot-de-chambre* would be obviated.

Hard, striped woods, as a covering to floors, should be substituted for oil-cloths, in all places where the latter and carpets are now used. In place of the latter, and where the bare floor is objectionable, mats or rugs, which can be taken up with facility and cleaned, should be introduced.

Instead of the wooden, open-top scuttle-butts now used by the men forward, fixed iron tanks, with stop-cocks for drawing off the water, should be substituted.

The men's "heads" should be covered sufficiently to protect them from wind and weather, and at the same time admit of the largest ventilation.

The sick-bay should be removed to a position farther aft and in close proximity to the dispensary.

Instead of the present inconvenient and inefficient arrangement, a plan of securing all tables by means of turnbuckles might be devised.

The spaces above the knees, communicating with the ship's bilges, and which are such a constant source of annoyance by reason of the foul odors issuing therefrom, should be hermetically sealed, particularly those in the various state-rooms. The

bilges should be accessible in every part, a point so often insisted upon, and so vitally necessary to the health of the ship's company.

When the ship is laid up in ordinary all floors below the spar-deck should receive successive coats of paint, of some light color, thoroughly dried and well laid on, so as to last during the cruise, and to obviate the necessity of shellacking or holystoning after the ship has gone in commission.

Bath-tubs should be furnished all ships, as well for the use of the crew as the officers.

Instead of windsails, never properly trimmed, unsightly and requiring to be lowered in foul weather, metallic, telescopic, hooded ventilators should be introduced to carry air below-decks.

*Ports visited.*—The *Vandalia* was put in commission at the Boston navy-yard, January 10, 1876, with a complement of 27 officers and 207 men, and sailed February 4 for Norfolk, Va., where she arrived February 7. March 15, she was suddenly ordered to Port-au-Prince, Haïti, in consequence of the breaking out of a revolution at that place, and arrived March 28. April 7, sailed for Kingston, Jamaica, calling at Jacmel *en route*, and arrived at Kingston April 11. April 20, having coaled, sailed on return to Port-au-Prince, and arrived April 22. The revolutionists having succeeded in inaugurating their government, and affairs on shore being quiet once more, the ship was ordered on a cruise to Aspinwall, United States of Colombia, and vicinity, and sailed May 9, arriving at Aspinwall May 15. July 14, in obedience to orders, sailed for Port Royal, S. C., arriving on the 25th of the same month; and on the 28th sailed for New York, arriving August 2. At New York the ship was repaired, refitted, and complement of crew reduced to 161 men. Since then three additional officers have joined the ship, increasing the number of the latter to 30, and making a total of



officers and men, 191. September 11, sailed for the European station; searched two weeks unsuccessfully for reported rocks off the Azores, and arrived at Lisbon November 1. Thence proceeded successively to Ville Franche, Leghorn, Messina, and Smyrna, at which latter port the ship is now, January, 1877, lying at anchor.

*"Burnettizing" or carbolizing.*—In the construction of the *Vandalia*, the timbers, etc., with the exception of the ship's frame, the bulkheads on the berth-deck, and the ceiling between decks on the starboard side, were subjected to the process of carbolizing, or burnettizing, so called, having for its object the preservation of the wood from too speedy decay. This process, under the Hayford patent, consists, in brief, as follows: The timbers are placed in suitable iron tanks and steam applied until the temperature reaches 150°. They are then "treated" with the "gas liquor" obtained from gas-works, one of the by-products of the destructive distillation of coal, and of which carbolic acid is the principal antiseptic constituent. This gas liquor is introduced into the tanks, through perforated pipes, in the form of fine spray, under a pressure of 45 pounds to the square inch, and continued until the wood is thoroughly impregnated, the entire process occupying about 48 hours.

When the ship was placed in commission, although the season was mid-winter, the carbolic and other odors given off by the carbolized woods were very perceptible, and, at times, offensive, pervading all parts of the ship and impregnating such provisions, as, for instance, the ship's bread, as were stowed in a confined space and accessible to the fumes.

In the heat of the tropics, during the ship's cruise in the Gulf of Mexico, the carbolic odor was very annoying, and was more particularly noticeable in the wardroom state-rooms on the port side, the port steerage, and the warrant officers' rooms on the same side, the fumes being most oppressive in the pay-

master's and surgeon's rooms, particularly at night; and during this time it was necessary to ventilate them as freely as possible to make them habitable.

The deleterious effects of the inhalation of such an atmosphere soon manifested themselves, in a greater or less degree, both upon officers and men, by the following symptoms: During the night, increased urinary secretion; cough; irritation of the mucous membranes generally; restlessness, etc.; and during the day following, by dull, aching pains in lumbar region and across abdomen; headaches; sensation of fullness of head; constriction of chest; general nervous depression, etc. These symptoms disappeared after a time without any treatment.

In several of the wardroom officers' rooms, and in both steerages, it was found that the openings above the knees, communicating with the bilges, gave egress to the odors from the latter, mixed with carbolic fumes, in such quantities that it became necessary to seal these openings. This step was followed by marked improvement in the atmosphere of the rooms mentioned, although the peculiar odor continued perceptible until the return of cold weather, since which time no inconvenience has been experienced. The carbolic fumes, however, continue to pervade, although to a less degree than formerly, the closed store-rooms, magazines, etc., in the hold; and I am informed that the bread recently received on board at Lisbon has the characteristic taste, as formerly, but that this is soon dissipated by exposure to the air or by moderate heating for a short time at the galley.

As to the advantages to be derived, in a sanitary point of view, from the process of carbolizing, and its supposed efficacy in the prevention of epidemics on board, about which so much has been said, I am of the opinion that it will prove of but little, if any, avail in that direction.

*Smyrna, Asia Minor.*—The city of Smyrna, one of the oldest

as well as most populous in Asia Minor, is situated at the head of the bay of the same name. It is pleasantly located at the base of a range of high hills, the principal of which is Mount Pagus; extends for a distance of about two miles along the waterfront, and has a population of about 250,000, of whom about 130,000 are Greeks, foreigners, etc. The streets are, for the most part, paved with cobble-stones, are very rough and uneven, without sidewalks, and, like those of all Turkish towns, are exceedingly narrow, dark, crooked, and filthy. In the Turkish quarters the houses are small, dingy looking, illy lighted and ventilated, and so closely packed together that they seem piled upon each other. They swarm with human life, and when the hygienic surroundings and the utter indifference of the natives as to any sanitary precautions, or measures of police, both in their dwellings and thoroughfares, are taken into consideration, it is a source of wonder, not only that the city is so healthy generally, but that violent epidemics are not of frequent occurrence.

The winter is the rainy season, the largest amount of rainfall occurring in the month of February, during which time the narrow streets frequently run knee deep with water.

Although not under government surveillance, the houses of prostitution are restricted to a locality in close proximity to the Pont des Caravanes, outside the city proper. Private prostitution is common, and venereal diseases prevail extensively.

Dr. Macraith, surgeon to the British Seaman's Hospital, with whom an interview was had concerning the present and past sanitary condition of the city, states that there have been, during the forty-one years of his residence here, three epidemics of cholera. A few years previous to his settlement, in 1835, the first and severest visitation of the epidemic appeared, and at its close had caused a mortality of 11,000, the population being then not nearly so great as at present.

In 1839 a second visitation resulted in the death of 7,000 persons. Subsequently, at intervals of ten or twelve years, two other epidemics of the disease appeared, the first causing a mortality of 5,000, the last of 2,500 persons.

It has been observed that each successive epidemic has procured the death of fewer persons than its predecessors, notwithstanding the fact that the city has, during the thirty years in question, increased in population by some forty or fifty per cent., and that no measures of prophylaxis have been taken by the authorities, and no evident improvement in medical treatment has been made. Dr. Macraith believes that this diminishing mortality is due, not to any alteration in the epidemic character of the disease, but to the fact that the constitutional impression made upon the systems of those who have once suffered the disease, or its prodromata, protects them, to a certain degree, from future attacks. Those who have died in the later epidemics have seemed to be chiefly persons who had escaped the former ones, and children born since the last visitation. In each instance cholera was clearly imported from the East. No evidence of its endemic, or even sporadic, presence here has ever existed. Cases of cholera morbus are seen about as frequently as in our own country.

Among the natives malaria is the great disease and death producing cause. Not that pernicious fevers are common, but the malarial poison firmly and permanently fixes itself upon the system, diminishes vitality, enlarges the spleen, and produces the malarial cachexy in its worst forms, which, in turn, affects the course, and increases the mortality of all other diseases. Fortunately the city itself is protected from this influence by Mount Pagus in the rear, and, upon the northeast, where the miasma might find exit from the valleys behind upon the town, the dense groves of cypress in the Turkish cemetery effectually act in the way (whatever it may be) that trees are now known

to act upon malaria, and entirely prevent its passage. Winds, however, occasionally prevail from the low meadows toward Bournabat, in which event intermittents inevitably appear in the city. Fever is almost certain to follow exposure between sunset and sunrise in the valleys toward Buja and Kukhlaja.

Typhoid and typhus are not common, though the filthy condition of the streets, the crowded state of some quarters of the city, and the pools of stagnant water, saturated with organic matter putrefying in the sun, would seem fit to develop the typhoid poison in its highest intensity. During the Crimean war great numbers of cases of typhoid were treated in the military hospitals established at this place. Not a single case, however, was developed here, all having appeared in camp in the Crimea, or in barracks in some of the military posts upon the Black Sea. At that time Mr. Spencer Wells, and other distinguished London surgeons, then in the English military service and attending upon the hospitals here, expressed to Dr. Macraith their surprise at the freedom of the city from the endemic prevalence of typhoid fevers, since all the usually accepted causes were rife, and unchecked by sanitary precautions. Then, as now, there was an abundant supply of water from artesian wells in the town, and to the constant flowing of this through the drains, Dr. Macraith attributes the almost entire immunity of the place from this disease. The sewers, though seemingly illy constructed, in reality serve their purpose well. They are superficial, scarcely more than a foot or two beneath the surface; their inlets, which are protected by close gratings, are set horizontally in the centre of the streets, which latter incline from either side toward the middle. The sewers receive surface drainage from the houses, and readily discharge their contents by the natural inclination at which they are set. Sewage is discharged directly into the harbor, whose waters, it is worth noting, are intensely and unusually salt, thereby possibly serving a sanitary purpose in preventing putrefactive change.

The very free use of water and the universal cleanliness and sweetness of the interiors of houses in the Frank, Armenian, and Greek quarters, together with the fact that these houses are extremely well lighted and ventilated, doubtless does much to preserve the health of the city. Lighting and ventilation are usually effected from a court, partially enclosed by the house; this court being often of considerable size and tastefully planted with orange, lemon, and other semi-tropical trees and shrubs. The contrast between the internal condition of the houses where the instincts and habits of their tenants have sway, and the wretched state of the thoroughfares and markets over which the government presides, is so great as to lead us to admire the domestic good order and cleanliness of the better and middle classes, and strikingly exhibits the absence of any attempt at sanitary regulations on the part of the city authorities.

In this connection it may be well to mention that vesical calculi are common in Smyrna, Dr. Macraith, alone, during his residence here, having operated sixty-eight times, with such remarkable success as to have lost but three cases out of the entire number. The patients were of all ages from one up to seventy-four years. The calculi, which were kindly exhibited by the doctor, have been by him fully described in various issues of the London Medical Times, and comprise specimens of all the ordinary forms—urates and phosphates predominating and forming the largest stones. Several specimens of oxalates, with their typical mulberry-like acini and sharp spicules, indicate, perhaps, an unusual frequency in the occurrence of this variety. Two cases were of encysted calculi; both stones were large, one being of a perfect hour-glass shape. Dr. Macraith prefers the median operation, without respect to age, and this he has always performed. For his success in operating, and his intelligent communications to the London medical periodicals upon many professional subjects, he was, some years since, made a Fellow of the Royal College of Surgeons of England.

There are no government hospitals, nor, so far as has been ascertained, any eleemosynary institutions of any kind, in Smyrna, and foreign powers are necessitated to provide quarters for the accommodation of the sick of their respective nationalities. Similarly they have also their own prisons for the confinement of offenders.

I am indebted to my friend and associate, Dr. G. C. Lippincott, United States Navy, for most of the information relating to Smyrna, contained in this article.





**NORTH PACIFIC STATION.**



## NORTH PACIFIC STATION.

U. S. S. LACKAWANNA.

REPORT OF SURGEON GEORGE W. WOODS.

*Hygiene.*—Complement of officers and men, 224; cubic air-space, wardroom, 7,840 feet; steerages, 4,810 feet; berth-deck, 16,926 feet; sick-bay, 1,780 feet; percentage of sickness, .464; percentage of mortality, .00892 +.

The ventilation is most excellent throughout the entire ship, and could scarcely be improved in a vessel of this class.

I beg leave to call the bureau's attention to the imperfect manner in which the wardroom is lighted. The only hatch opens upon the poop into a long ventilator, and is supplemented by two air-ports in the deck forward of the mizzen. This is ample for ventilation, but is so insufficient for the purposes of illumination that when the awning is spread it is almost impossible to read or write in the day-time at any distance from the hatch. Asthenopia has been frequent among the ward-room officers during the year, and is properly attributable to the defective illumination of their quarters. It would seem that by a rearrangement of the after pivot-gun and the wheel, sufficient space might be obtained for the cutting of a small hatch to remedy the defect mentioned.

Steam-heaters are placed in all the officers' quarters, but none on the berth-deck. The galley, however, serves every purpose for the comfort of the men below during the day, and my own experience is adverse to any special means of heating in this portion of the ship. Steam apparatus, even in the officers' quarters, is difficult of regulation, and the comfort it affords disproportionate to the sickness it so frequently produces.

A portion of the quarters is almost always overheated when the present apparatus is in use, and it is a fruitful source of catarrhal disease. A better arrangement would be a line of pipes running along the water-ways, by which a more uniform distribution of heat would be obtained, and the present disagreeable concentration of it avoided. Some regulation for the maintenance of a standard temperature is also desirable.

Distilled water has been used throughout the year, save at Honolulu, Hawaiian Islands, where, during five months, pure mountain water was obtained from the city water-works. It is preserved in the usual iron tanks. No aerating apparatus is attached to the condenser, nor is there any means of exposing the water to the air after condensation beyond the mere surface exposure in the tanks. As a consequence, it retains for a considerable time the peculiar oily flavor of recently distilled and unaerated water; and the storage capacity not being sufficient for so large a ship, it is often necessary to issue water when almost tepid, and from its flavor scarcely to be considered as potable.

The usual ship's ration, only modified by fresh meat and vegetables when obtainable, has been furnished throughout the year, and has been admirably cooked. The canned beef, though of prime quality, is a portion of the ration not esteemed by our men, and is in large quantities thrown overboard. It might advantageously be replaced by some more desirable article of food.

In the list of paymaster's clothing all seems to be of good quality save the cloth pants and undershirts, which are rotten. The latter are of flannel, too short in the body and sleeves, shrink badly, and are not equal to the knit undershirts formerly issued. The cloth, linen, and flannel served out are of a very superior quality.

During the year every sanitary precaution has been taken by

the commanding officer to avoid the contraction of malarious disease by the crew, and to prevent all affections which might arise through exposure to dew or moisture in any portion of the ship, resulting in a very small percentage of sickness attributable to these causes. Our anchorages have always been selected with a view to sanitary considerations. The awnings have been spread, during our stay within the tropics, from 8 p. m. to sunrise, and the berth-deck has been kept scrupulously dry, while no liberty has been granted in any port where there was the slightest evidence of epidemic or endemic disease prevailing.

Under this head I would beg leave to express my personal views in regard to the desirability of changing the position of our sick-bay, not only in this ship but throughout the Navy, a location which has been abandoned, or at least not so utilized at present in the ships of other services which I have inspected. Its only advantage is that it is out of the way and can easily be cut off from the rest of the berth-deck, while its disadvantages are manifold. Its ventilation in port is generally good, but no better than any other portion of the ship, and at sea it is the one place in which the air-ports must be kept rigorously closed. As regards light, it is the darkest portion of the ship, candles being in use always at "sick-call," a condition most unfavorable with our present views of the importance of light to recovery from disease. Quiet is generally considered important to the sick; but here we find the sick-bay located in the very focus of noise, beneath the forecastle, where the crew gathers through the day, where the carpenters are stationed, and where the head-pumps are working the entire twenty-four hours. Here also we find the greatest degree of motion, indescribably disagreeable to a sick man under the circumstances of a heavy head sea.

My own opinion is that a sick-bay, possessing all those advantages which the present location does not possess, could be

arranged on the berth-deck near the main hatch, and embracing the present dispensary within its limits. This is the position selected in the English navy; and here we should find ample ventilation and abundance of light, and freedom from the annoyances of noise and excessive motion, at present so prejudicial to the comfort and recovery of those who may be seriously ill.

*Medical topography.*—The principal places of interest visited during the year have been Pichiluego Bay (La Paz), Mexico; Honolulu, and Molokai, Hawaiian Islands.

*La Paz.*—La Paz is at the extremity of an extensive harbor on the eastern coast of the peninsula of Lower California. The channel of approach is so tortuous that the larger vessels of our Navy make an anchorage at Pichiluego Bay, 8 miles from the town, a most perfect little harbor. The whole country is a mass of recent volcanic upheaval, precipitous mountains covered with cactus, with here and there at long intervals small valleys like that of La Paz. The soil is not very deep, but fertile and well drained, yet the inhabitants are too indolent to develop its resources. Fresh water is easily obtained from shallow wells, but is of an inferior quality and highly impregnated with alkaline salts and mineral ingredients, to which the local physicians attribute the prevalence of gravel and renal calculi. Typhoid fever is almost unknown, and malarious disease not common. Phthisis pulmonalis is frequently met with, and is rapid in its progress towards a fatal result. This is probably due to the temperature during the winter months being quite low, and the daily variation very considerable. For this no preparation is made in the way of change of clothing or increased bedding, nor is there any arrangement for the warming of dwellings. During our stay, from December 29, 1876, to January 6, 1877, the highest thermometer was 79° and the lowest 66°, but the variation is often greater.

During the spring of 1876 La Paz was visited with a most terrible epidemic of variola, resulting in the death of five hundred out of a population of less than twenty-eight hundred. The epidemic was not of a malignant character in any degree, and foreigners protected by vaccination escaped in every instance. The fearful mortality was attributed to neglected dietetics, want of medical care and good nursing, and sea-bathing in the eruptive stage of the disease.

A small commerce has recently arisen between La Paz and the United States in a native plant, known as damiana (*Turnera aphrodisiaca*), which is found in large quantities on the western coast of Mexico, but especially in this peninsula. It is a low shrub, bearing a small oblanceolate dentate leaf, which is the only part made use of, although its medicinal properties undoubtedly reside in other portions of the plant, and seem to be embodied in an oleo-resin. It is here in universal use in the form of hot infusion, domestic tincture (the leaf macerated in the native mescal), and cordial. In its weaker forms it is esteemed as a general tonic, and preservative of the sexual power, while the stronger preparations are powerfully stimulant to the sexual organs of both male and female. It is undoubtedly an aphrodisiac of considerable power, somewhat tonic, slightly cathartic, and apparently having some hepatic action. Emmenagogue properties are also attributed to it. A patent medicine is prepared from it, in the form of an agreeable cordial, and extensively sold in La Paz under the name of "Damiana Fort," and I herewith present the merits claimed for this preparation in a translation of the label, as it represents so perfectly the popular idea of its efficacy.

DAMIANA FORT.— \* \* \* \* "Taken before meals it gives an appetite, and prevents all indigestion if taken after meals. It exercises a wonderful influence over the nervous system, and is an efficacious aphrodisiac. The frequent cases

of longevity observed in this territory, and the power possessed by sexagenarians of obtaining offspring, as though they were still young, are due to the use of damiana. \* \* \* By using this excellent liquor the following results are obtained: Re-establishment of the menstrual function; cessation of impotence and sterility; it is successful in all infirmities of the urinary organs and kidneys, and, in fact, prolongs life. All these great benefits are obtained by frequently taking this liquor, according to the experience and testimony of respectable persons."

The medical faculty is represented in La Paz by two Mexican physicians, graduates of the college of Guadalajara; one American, and a German ophthalmic and aural surgeon, an invalid temporarily resident here. Associated with the practice of all save the latter is an excellent pharmacy. Physicians are not permitted to practice in any portion of Mexico without a certificate of proficiency from the medical examining board of either the Guadalajara college or that of the city of Mexico, a law which renders the country singularly free from quacks. The college at Guadalajara is an excellent one, and has the clinical advantages of an immense hospital, which commands the admiration of all who visit it. At this city is published the only medical journal of Western Mexico. It is a weekly, of rather feeble character, under the control of the "Sociedad de Medicina de Guadalajara."

*Honolulu.*—This beautiful town, the capital of the Hawaiian Kingdom, is situated on the western slope of the island of Oahu, at the foot of lofty volcanic hills, and occupies a plain stretching to the south and west. The soil, formed of decomposed lava, is very absorbent, which prevents the absence of any form of sewerage from being seriously felt, and, supplemented by the constantly-blowing trade-winds, overcomes any tendency to zymotic formations.

To the north and east of the town opens the Nuuanu Valley,



a cleft in the hills, extending to the eastern side of the island, admitting the northeast trade-winds, which modify the excessive temperature during the greater portion of the year. In the winter months the "trades" blow with less severity, but bring abundant rain, and are occasionally interrupted by strong, southerly, hot winds, termed konas, also accompanied by rain, which frequently become severe hurricanes.

The average temperature during the dry season, April to October, is about  $81^{\circ}$ , the highest thermometer observed during our stay being  $84^{\circ}$ ; the lowest,  $78^{\circ}$ . The annual range of the thermometer is only  $12^{\circ}$ , rising rarely higher than  $86^{\circ}$ , the greatest heat occurring in July, and the greatest cold in January.

Honolulu is built like the villages of New England, most of the houses being of wood, in the villa style, with broad verandas to each story, and thorough ventilation by means of numerous windows. The dwellings belonging to the people of means are placed in the midst of extensive grounds, and surrounded by luxuriant shrubbery. Many of the natives are well housed, but the greater portion of them still occupy the ancient grass hut, an ill-ventilated, thatched structure, where they live, crowded together, in the midst of their fowls and pigs.

An abundant supply of pure mountain water is obtained from a stream running through the Nuuanu Valley, affording all that is necessary for domestic purposes and for irrigation, while it is publicly distributed through the means of numerous drinking-fountains.

With good drainage, an abundance of pure water, a moderate temperature, with small diurnal variation, and the constant presence of the trade-winds, we have the conditions which should make Honolulu a remarkably healthy city, and this it undoubtedly is. The climatic conditions are, however, not favorable to phthisis, and a fatal result often follows a short residence. This has been attributed to the constant winds,

which are often comparatively cold, and, in the winter, laden with moisture, creating draughts throughout the dwelling, and promoting chills and congestions in those affected with pulmonary trouble.

Rheumatism is common here from the influences of the rainy season, and, at other periods, from a residence in proximity to the overflowed patches of tara (*Tarum esculentum*), an aquatic plant largely cultivated here, its amylaceous root, in the form of poi, constituting, with fish, the principal native food. Common continued fever is frequently met with, and syphilis is widespread.

In the past, Honolulu, as well as the rest of the kingdom, has been scourged by epidemics of variola and rubeola, their extremely fatal character being attributed to the passion of the people for an indulgence in sea-bathing, which even disease could not control, and, additionally, in the case of variola, to the absence of protective vaccination.

At present the one disease claiming attention in these islands is leprosy, which will be referred to under the head of Molokai.

The Queen's Hospital of Honolulu was established by Kamehameha IV, and is supported by a tax of \$2 on passengers arriving in the kingdom, and by appropriation. It is a fine structure of coral rock, having a frontage of 100 feet by a depth of 50 feet, two stories in height, and situated in the midst of beautiful grounds. There are 5 wards, each 40 by 20 feet, and 12 feet in height, containing 13 beds each, and 5 smaller wards of only 8 beds each, the dimensions being relatively the same. All the wards are well ventilated by means of windows and openings in the ceilings communicating with ventilators. An attending physician, not resident, one apothecary, and nurses as required, form the medical staff, and the hospital is furnished with the most modern instruments, as well as all the more recent medicines. The principal affections treated are syphilitic,

cutaneous, and surgical, and the average number of inmates, most of them walking cases, is about forty. The leprous patients are not admitted to the Queen's Hospital, but are kept at a "House of Detention" until their cases are decided, when, if condemned, they are banished to Molokai.

The Insane Asylum is a small but well-conducted institution under the management of a resident superintendent and a visiting physician. At present 28 patients are under treatment—representing the average number—and about \$10,000 is appropriated for its maintenance biennially.

All the sanitary matters of the kingdom are controlled by the Board of Health, which has charge of everything that may affect the public health, and embracing the quarantine, leprosy, and the insane. It is composed of three members, two being physicians, the third being a member of the House of Nobles, sitting as chairman or president. It is an extremely intelligent board, and their biennial reports are full of interest. Under their control are also the so-called "travelling physicians," who visit the various districts of the different islands for the purpose of administering to the sick, who otherwise would only have the attention of native "kahunas," or witches, to ferret out the lepers, and in every way endeavor to preserve the native race which is fast approaching extinction. In this latter connection it may be well to note that the Chinese, now forming a very considerable portion of the population of the kingdom, are intermarrying very extensively with the native women. The vitality of their offspring, as compared with the fast disappearing native race, is not yet demonstrated, but is likely to be superior, and another generation may see this mixed race entirely supplant the native Hawaiian.

*Molokai.*—The leper settlement of Kalawao is admirably located in a narrow valley, representing the crater of an extinct volcano, on the northern shore of the island of Molokai. It is

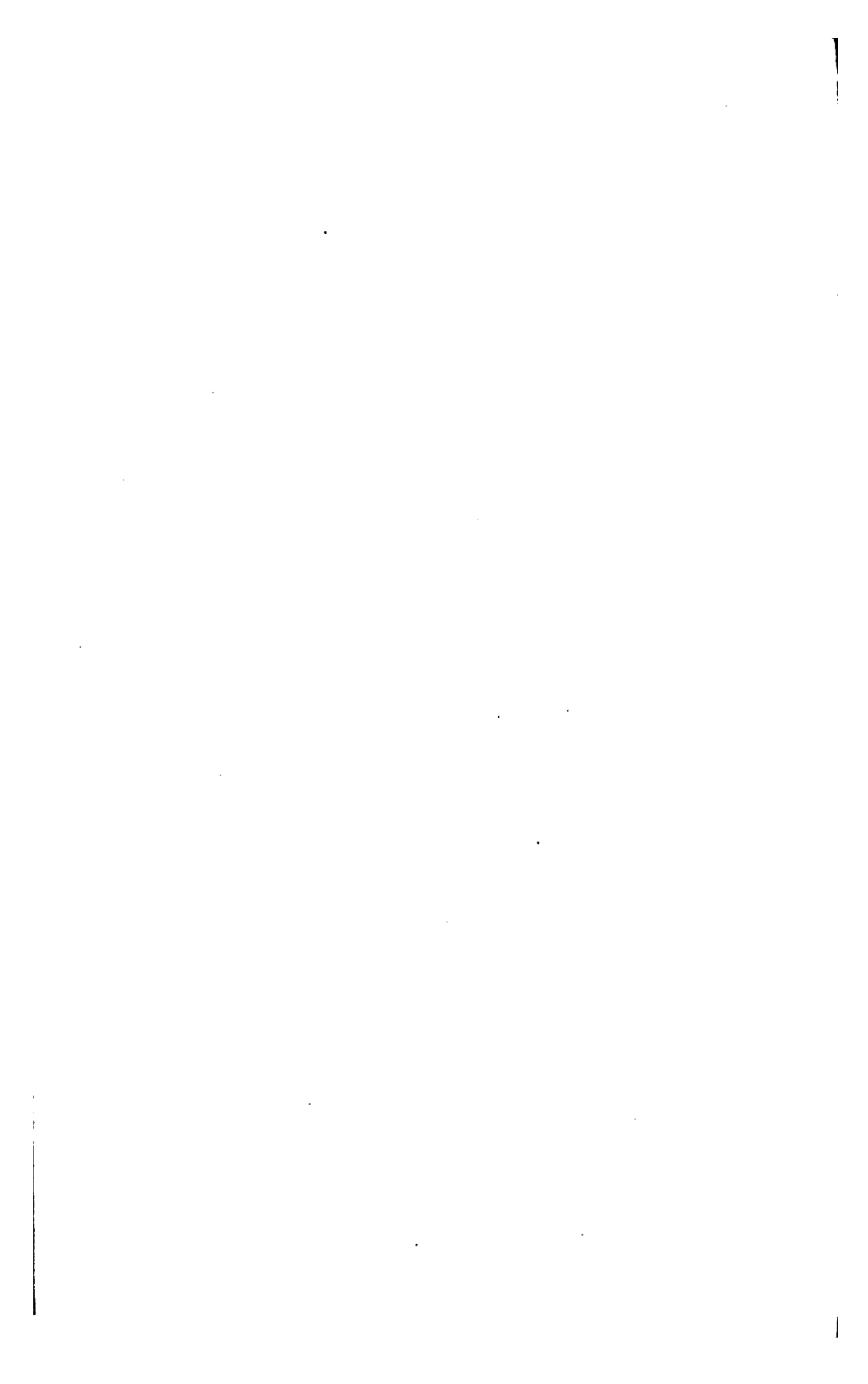
bounded on one side by a precipitous pali, or precipice, 2,000 feet in height, and on the other by the ocean, from which direction it is exposed to the searching trade-winds. Through this valley are scattered native huts where the lepers live in privacy, only the worst cases being admitted to the hospital. The latter is a clean and commodious series of cottages under the superintendence of an apothecary, medical attendance on the settlement being confined to the monthly visits of a "traveling physician." As leprosy is considered incurable, no treatment is attempted beyond the mere dressing of wounds and ulcerated surfaces, with attention to dietetics. The lepers are provided for most admirably, having comfortable homes, a sufficiency of food and clothing, cattle and horses, while around their dwellings they cultivate all the tropical fruits, which are produced in great abundance. They seem an extremely contented community, and in spite of the disgusting disease with which they are afflicted, it is fortunately attended with so little suffering that they may be said to be absolutely happy with all needful comforts supplied and an entire freedom from care and trouble. The *leper* population of the settlement is now 698. The annual commitments are about 150, and the deaths amount to nearly the same number. The annual expense is about \$28,000.

The Board of Health examines all suspected lepers in Honolulu, to which city they are sent from the various districts, where they are kept under observation for some time, and when the disease is established beyond a doubt they are committed to Kalawao for the remainder of their lives and become civilly dead. The board has control of the leper settlement, and is here represented by Gov. W. R. Ragsdale, a half-white, and a leper, a lawyer by profession, and a man of highly intellectual character. He is looked upon by the people as their chief, and rules them in a simple, patriarchal manner.

I reserve for a special report, which I am preparing, an account of a week's residence at the leper settlement of Kalawao, including a history of leprosy as it has developed itself in the Hawaiian Islands, with an attempt to depict the disease as it at present exists.



**SOUTH PACIFIC STATION.**  
**1876.**





## SOUTH PACIFIC STATION.

### U. S. FLAG-SHIP RICHMOND.

#### REPORT OF MEDICAL INSPECTOR BENJAMIN F. GIBBS.

*Hygiene.*—Complement of officers and men of this ship, 341; number now on board, 312; mean strength, 327.

The cubic air-space for the berthing apartments, together with that allowed each individual on board, exclusive of the admiral and commanding officer, whose spacious apartments leave nothing to be desired, is given in my previous paper on "Ventilation of ships of war," and published in the bureau's last annual for 1873.

*Percentage of sickness.*—The amount of disease on the station has been forwarded quarterly to the bureau, and the percentage of cases to mean strength may be given as follows: Total number of admissions, 267; on a mean strength of 327 gives 81 per cent., or 810 to a thousand. Deaths were 3 in 327 persons, or 9 in a thousand. Invaliding, 6 in 327 persons, or 18.34 in a thousand.

The aggregates for the station, comprising diseases, &c., were made in the usual quarterly reports. In these there are, it seems to me, some errors or lack of uniformity in making percentages of sick, which call for further instructions to make the matter more clearly understood.

First. I would notice the peculiarities of a single calendar year for the South Pacific Station, ending July 1, 1876. The average strength of the squadron was 596. The total number of cases admitted for this calendar year was 703, so that the cases exceeded the number in the squadron by 107, amounting to 117 per centum on the mean strength. The average number daily

on the sick-list was 23. This, on the same mean strength, is .0385 per centum for those daily sick, or daily average of sick-days. Number of persons who died for the same period were 4, or .0067 of the mean strength. Number of persons who were invalided for same period 24, or 4 per centum of the mean strength. In the squadron, notwithstanding the excess of cases above the mean strength for a whole year, we have only 40 per cent. of cases on mean strength for a single quarter. This shows a proportion in loss of numbers without any corresponding change in the amount of disease. The excess of 107 cases in the year above the average mean strength is accounted for by the numerous readmissions, and accumulation of cases, while the mean strength remains the same.

Those medical officers whose reports appear in the sanitary and medical reports published by the bureau for 1873, have not interpreted alike the order in the instructions to medical officers at page 17, embodied in the words "and percentage of sickness and mortality." Most of them construe it to mean the percentage of daily average sick-list on the whole number of persons on board.

Medical Inspector Denby gave percentage of sickness to complement of 378 as .0293. Surgeon Spear gives it as .025 of complement, but does not refer to the daily average of sick days. Medical Inspectors Gihon and Leach give percentage of whole number of *cases* or admissions for the year, on complement of the ships. The former, at page 249, *op. cit.*, gives percentage of sickness to whole number of persons on board as 43; the latter as .783 per cent., and fully expresses his estimate of the order in saying, "of cases to whole number of persons on board for the year." These two latter medical officers are the only ones who seem to have correctly estimated the value of the order requiring percentages.

It seems to me in view of the above that this is the proper

place to seek a more correct understanding of the subject, and greater precision in language regarding what percentages mean. The above excess of cases over the mean strength in the South Pacific Station for a whole year should be attentively considered. Many medical officers attempt to intelligently disregard this peculiarity in enumerating cases, by obtaining a decimal for the percentage, as in the reports above referred to, which is nothing else than the daily average number of sick-days for the year, on the mean strength for the same period, and which I believe to be incorrect, if applied to different periods of time and different numbers in the same squadron.

The present report being a yearly one, it seems to me highly improper to take the percentage of sickness from the average daily sick-lists. A thousand of these sick-days could be produced in a year by *three men*. It seems a better plan to give in an annual report the whole number of cases admitted as a basis of percentages. This is done in the few persons who are invalided or die during the year, such percentages being given on a full complement for a year. No instance could well occur in the service where the numbers invalided or dead would be so great as to call for a *daily* average number of these, on the mean strength of the vessel to be reported as the percentage of deaths or invalids. These are *yearly* percentages of persons on the mean strength. Why, then, should not the total enumeration of sick persons for the year be recorded as a percentage of the mean strength for the same period? It is clear that in case a mortality should be so great as to equal the mean strength, this would be 100 per cent. The above is one plan for obtaining percentages.

In another, the unit of a thousand might be adopted as is now used by vital and other statisticians. In case this plan be used the excess of cases over the mean strength would in the same way show a more unhealthful ship or station, and which cannot

be realized if percentages are computed on the basis of numbers on the daily average sick-lists. The British navy use the unit of a thousand for their sanitary reports. Their health report in the China fleet for 1875, gives "mean force 2,900; cases, 4,096, and ratio of cases to strength, 1,691 per thousand."

It is only in squadron or fleet returns of percentages of sick for a year that this excess of cases will probably occur. It is best to have some rule established whereby uniformity may be secured. Following the above statement the question is whether the annual percentage of sickness for a ship or station shall be computed on the daily average number of sick-days, or on the total number of persons admitted during the year, to the average strength of such station or ship.

There is still another plan to which I shall again refer and to which I give my preference in obtaining this percentage, and which is, take as factors the whole number of *well-days* against the whole number of *sick-days*. Percentages obtained in this way will bear a uniformity regardless of the numbers or periods of time which may be used.

In the South Pacific Station for the calendar year in question, 23 is given for the third quarter, 1875, as the "daily average number of *patients*," in the aggregate report of sick for said quarter. This is plainly incorrect; 591 was the average mean strength for that quarter, and there were 184 cases treated in the same period. This gives exactly two patients admitted daily for the quarter, and 31 per cent. on total mean strength. These 184 cases were treated 2,164 days. As will be shown later when computing average expenses, if this should be desirable, the amount is the same whether we seek it for "days" or for "patients."

The following statement will serve to show the difference of result in expressing the amount of sickness in a squadron, compared with that in a single ship, where this is obtained from a

percentage of the daily average sick-lists on the mean strength in one case, and in another from percentages of number of cases admitted to the same mean strength :

*Comparative exhibit of sickness, mortality, &c., for a calendar year in the South Pacific Station, between that of the whole station and that of the single ship Richmond.*

Numbers and percentages.	United States flag-ship Rich- mond.	Three ships, South Pacific Station.
1. Whole number of sick-days .....	3,913	8,400
2. Mean strength .....	327	508
3. Number of sick-days to each man of mean strength ...	11.96	14.09
4. Whole number of cases admitted for the year .....	287	703
5. Actual number of days each patient was sick .....	14.65	11.94
6. Yearly percentage of cases to mean strength .....	810	1.179
7. Daily average of sick-days for 365 .....	(10 $\frac{11}{117}$ ) 10.62	(23 $\frac{5}{117}$ ) 23.01
8. Percentage of daily average of sick-days, for 365, to mean strength .....	0.0321	0.0385
9. Number of deaths for the year .....	3	4
10. Percentage of same to mean strength .....	0.0091	0.0067
11. Number of invalids for the year .....	6	24
12. Percentage of same to mean strength .....	0.0183	0.400

One of the most important features of the above table is the great disproportion in line 6 of percentage of cases to mean strength. This difference between the ship and squadron is the result of the cumulative nature of a yearly report, in which cases are added, while the mean strength remains the same. The average daily numbers of sick-days, represented in percentage of mean strength in line 8, are unsatisfactory as daily exhibits of comparison, for they are nearly alike, while the daily averages of sick-days are 10 and 23, which very dissimilar factors produce the above similar results.

That the sickness in the Navy for yearly or statistical purposes is not exhibited by the present mode of calling sick-days patients, I submit the following as a demonstration and as might occur in the Richmond with 327 of mean strength, viz: Ten persons sick for one year, would give 3,650 sick-days, and, of course, making a daily average of sick-days of 10. This would produce a percentage on the mean annual strength of .0305.

The actual annual result, as will be seen above, for the Richmond (see table), is about this of daily average of sick-days, or  $10\frac{2}{3}$ , and yet in the ship the whole number of cases for the year are 267, or a percentage on mean strength of .81, which must show the fallacy of any sick-statistics based on the daily average of sick-days for the year. The percentages in both cases are the same, while in one instance the number of cases are 267 and in the other 10.

In this connection it would strike me as highly proper that such expressions as "daily average number of patients" in the quarterly report, which average refers to 90 days, should be replaced by "daily average of sick-days." If the not unusual number of 91 patients were to occur in a 91-day quarter, there would be just one for a daily average of patients, while for a single day the number of patients may be 10 or 15. The government would lose the services of 91 men during the quarter, and a number of days for each one equal to the number of times 91 may be contained in the total number of sick-days for the quarter. In former blanks for quarterly reports of sick, there was required the daily average cost per man, expressed in decimals of a cent, which were hundredths and sometimes thousandths. The manner of obtaining this fraction indicated that it required simply the cost of *one sick man for one day*, of which days there might have been three or four thousand, with but 10 or 15 men sick. The question recurs, are we seeking days or men?

A very practical advantage may be derived from correctly appreciating the total number of patients annually reported in the Navy. Suppose there are 1,000 men and officers in the service, and that during the year there have been admitted 2,000 patients, would not this show an immense amount of feebleness and disease, demonstrating the necessity of discharging in some way an immense number of men?

Regarding making an estimate of expenses, if for any reason this should be necessary, it makes no difference whether we divide the expenses for a quarter by the total of sick-days or total of sick men. In the Richmond, as before stated, the 1876 mean strength was 327, and the number of patients for the quarter, without fractions, was 67. The expense for one quarter was \$422.14, making a cost of taking care of one sick man, three months, \$6.30. If we take a quarterly average (978) of the annual number of sick-days (3,913) for 1876, and by it divide the above expenses (\$422.14), we have 43 cents as the cost of one man one day; whereas in the above, \$6.30 for *one sick man* three months, we have one day's expenses, amounting to 43 cents, on account of 14.65 days' illness in the quarter, which is the same as when the expense is divided by the number of sick-days in the quarter. This is represented by the following comparative statement:

Showing the quarterly expenses per man per day on account of <i>sick-days</i> in the Richmond.		Showing the quarterly expenses per man per day on account of <i>sick men</i> in the Rich- mond.	
Quarterly average sick-days .....	978	Quarterly average sick-days .....	978
Quarterly expenses .....	\$422 14	Quarterly average sick men .....	67
Daily average for 92 sick-days ....	10 $\frac{1}{2}$	Quarterly average of expenses .....	\$422 14
		Average cost of one man for the quarter .....	\$6 30
		Average number of days one man sick .....	14.65
Cost of one sick-day .....	\$0.43	Cost one man for one day's illness...	\$0 43

The old style of "daily average cost per man" is therefore expressed in the last line. But it seems less satisfactory to obtain the cost in this way than to find the daily average cost of sick men or patients. In above table this would have been  $\frac{1}{92}$  of expenses for the quarter, \$422.14, or \$4.59. This is the cost of the daily average of sick-days of  $10\frac{5}{8}$ ; or of sick men, less than for an average of 1,  $\frac{7}{2}$ . Had there been 92 sick men, the average cost would have been the same for them all 1 day as for one of them 92 days, or \$4.59, as above.

In a paper compiled by Surgeon H. C. Nelson, assistant to Bureau of Medicine and Surgery, from the records on file in the bureau, there were 18,924 cases treated during two years in the whole Navy, for a mean strength of 26,593. For one year the number of cases are 9,462, on which he gives a percentage of sick men to mean strength of .79. Thus we have a further assurance that the bureau does not regard the daily number of sick-days as having any relation whatever to the annual "percentage of sickness."

*Conclusion.*—In view of all the foregoing, in which the varied factors of time and numbers are used resulting in a want of uniformity, there can be no simpler or more comprehensive rule for securing uniformity in percentages of sickness and mortality than by comparing the *whole number of sick-days* with the *whole number of well-days*. We will have by this plan an uniform result for daily, monthly, quarterly, or for yearly periods, on account of a common multiple for the sick as for the well days, whether we compute for a single ship or for a fleet.

In the above quarter of 92 days we have 978 sick-days resulting from the ordinary addition. We have 30,084 well-days resulting from multiplying the mean strength by 92, the number of days in the quarter. This gives a percentage, after deducting the sick-days from the well-days, of .033 per cent.:

$$30084 - 978 = 29106 = \text{well-days.}$$

$$978 \div 29106 = .033 \text{ per centum.}$$

*Ventilation.*—This subject was extensively treated for this ship in a previous paper on "The ventilation of ships of war," and published by the bureau in the annual report before mentioned. To the inadequate space now allotted for the sick-bay and its badly ventilated condition I would more particularly refer.

The sick-bay in this ship contains about 1,700 cubic feet of air-space, and is furnished with the most indifferent means of



ventilation. In fact, it is the worst ventilated part of the ship, excepting the yeoman's store-room, which is immediately beneath it. At some previous period in the history of the ship some effort was made to improve it, as the evidence of this abortive attempt still exists in the 12-inch sheet-iron pipe opening into the sick-bay from the fore-castle. Its present exit through the top-gallant fore-castle is beneath the slide of the pivot-gun. This exit is of course always closed with the brass plate, which cannot be removed without removing the gun. A ventilating cowl fitted to such a pipe extending several feet above the upper deck would make it available. No light, however, would be admitted by it.

There are really but three apertures externally for the ingress of fresh air, viz, two air-ports through the ship's side, each 7 inches in diameter, and an opening through the deck overhead, 30 inches in diameter, having its outlet beneath the top-gallant fore-castle. It seems that when this ship was originally built the break of the fore-castle came aft only as far as this sick-bay scuttle, so that there was the light of day and fresh air directly from without. The small top-gallant fore-castle was then used alone for working the anchors, &c. This part of the ship is now used for an absolute increase of berthing accommodation of the crew, whereby the quarters for the sick are deprived of the moderate amount of light and air which were intended for them in the original plan of the ship. The space for the sick remains the same, notwithstanding increase of numbers. At sea two of these apertures are closed, leaving only the scuttle, which receives at night only the most vitiated air from beneath the fore-castle. Toward the berth-deck there are various barriers to prevent the circulation of fresh air. The prison occupies the port side adjoining the sick-bay bulkhead. In the centre and on the starboard side two large reels for hawsers are placed upright, completely cutting off the little air that might descend

through the small fore hatch. To make the whole as much worse as possible, the ship's galley, the admiral's and the captain's stoves, and a large baking-oven almost completely make a line of fire across the berth-deck, and distant only 20 feet from the sick-bay.

Our sick-list requires very often that eight or ten men shall be billeted in hammocks or cots. The space only affords about 180 cubic feet of the most indifferent air-space to each sick man. What their chances may be for recovery, for comfort, or even existence with the above surroundings at sea, or in port in hot weather, I leave to those persons to decide who are able to take a disinterested view from their own standpoint of comfort on shore. Observations regarding the hygiene of ships' forecables and causes of disease on berth-decks have been so often made by medical officers of this and other navies that it seems unnecessary for me to say more. In former letters and reports, particularly that under date to the bureau of April 15, 1876, I particularized some points of defect in the construction of this ship, in which there has been a total disregard of all hygienic necessities. Among others, the following changes should be observed as absolutely necessary in repairing or rebuilding this ship or others:

1. The sick-bay should not be on the same deck, or if so necessarily, adjacent to the cooking space in the ship. It should in this be provided with more of the room of the berth-deck, so as to take in two more air-ports on each side. The after bulkhead to pass around three sides of the fore hatch, so as to be benefited by its light and ventilation. All obstructions to the external air to be removed from this hatch. The scuttle should be enlarged, if possible. A much more perfect ventilation would be secured for sea and increased in port by having hatches made for this purpose at the break of the forecastle 36 inches square, at *both sides* of the ship, instead of the centre, or

additional to the fore hatch. These would give abundant light and air to the *whole of the forward part of the berth-deck*, as well as to the sick-bay, if the latter must continue to occupy this part of the ship. The experiment of an innovation of side hatches of this kind I am satisfied would be crowned with the happiest results. The air-ports in the sick-bay should be 20 by 14 inches, as well as those of the whole length of the berth-deck, such as have been used in the British navy for the past thirty years.

2. The cooking should be done on the gun-deck, and all ships of war should be provided with a light spar-deck, with hatches of increasing size, and one directly above the other.

3. In case this extra deck cannot be provided, the sick-bay should occupy another part of the berth-deck, and its time-honored space consigned to some other purpose. Economy of space might be increased in the forward part of the ship by the introduction of steam capstans. Having no further use for the capstan-bars, the top-gallant fore-castle would yield its space for the use of the sick, or for water-closets for the men. In single-decked ships, for hot weather, a latticed bulkhead could be placed so as to enclose space for cots on the port side, while the starboard could be used for water-closets. By this arrangement the *coup d'œil* on the starboard side of the spar-deck, in a single-decked ship, would not be shocked. This is an important matter with those whose æsthetic tastes predominate in the determination of space in a war-vessel, to the extent of disregarding most important hygienic considerations, as well as that equally important matter, the comfort of the sick.

4. No ship should be allowed to be built which cannot afford space for a *clear berth-deck fore and aft*, as without this the slightest chance for ventilation must be lost or reduced to a minimum.

5. The latest composite British war-vessels have all the

rooms in the wardroom, and through the whole berth-deck, ventilated by means of a flue running from each room, passing up through the side of the ship until it opens just beneath the hammock-rail on the inside of the bulwarks. Here it is covered with a Venetian blind. Through this a current of air is constantly passing, usually from without inwards, and leaves nothing to be desired which can be secured by natural ventilation and without the use of power.

The sick-bay is supplied with a water-closet and lavatory. The water-closet has proved of great utility and convenience, adding much to the comfort of the sick and cleanliness of the sick-bay. It is astonishing that it was never before used in this ship, particularly as the exit for it is above the water-line. This one is, however, arranged to close against the sea water-tight. It has not been out of order during the cruise of more than four years, further than some trifling repairs which were done on board. I recommend the continuance of sick-bay water-closets.

The medical store-room needs some changes. There is but one, which is in the fore passage, and all medical stores, liquors, hospital stores, muslin, &c., must be kept in this one place. The medical department suffered on our way out to California in 1873 from the robberies of a villainous, drunken apothecary, who came out in the ship from Philadelphia. At different times, as he had access to the store-room, almost all of the liquors disappeared, and the bottles were refilled with water or urine, as was apparently most convenient at the time. I would urge that there should be a forward and after store-room made in this and all ships, for the purpose of properly dividing the medical stores—under any circumstances, if the store-room now provided shall be sufficiently large, to have a closet or apartment secured on the inside for spirits, &c., with a good strong lock, of which the surgeon should carry the key.

The dispensary needs some remodeling and another or a larger air-port for light. The new scales and weights supplied by the laboratory are a valuable addition, and work well in a sea-way.

The prisons on board this ship consist of two cells, each about 6 feet square, and being situated on the berth-deck are well lighted and ventilated.

As with most ships, during the early part of our cruise we suffered much from bilge-water. This was overcome by regular weekly cleaning of bilges, after which carbolic acid was freely used. The engineers became dissatisfied with the use of nitrate of lead, as it destroyed the soldering of the copper pipes. As a disinfectant I would recommend its removal from the allowance-table on account of its corrosive properties to metal, and an increase of carbolic acid and iron sulphate. There are yet times when a bad bilge smell escapes from a place beneath the after starboard magazine where it is impossible to clean, as the iron bulkhead comes down to the bottom of the ship, and to which there is no access from the shaft-alley.

The ventilation of the engine and fire rooms is good. That of the after orlop-deck is so imperfect that it should not be used as a part of the berthing room for the crew. Yet the crowded condition of the ship requires that men should occupy it. The air-space is such that each man has only 60 cubic feet of this terribly vitiated air to breathe.

The automatic foul-air and bilge pumps with which the ship was furnished were unsatisfactory, as they only work at sea by the motion of the ship, and Fleet Engineer S. D. Hibbert reported against the whole arrangement.

*Lighting.*—The berth-deck is lighted by the usual air-ports, 7 inches in diameter, fitted with plugs, spindles, yokes, pins, and other contrivances to keep out the vital forces and kill men in case one of them should ever be struck by a shot from

the enemy. There are fifty-six of these. They should each be a foot in diameter, or the system changed to that above referred to of square air-ports for the whole berth-deck, in which the dead-light may be increased to any desired size.

There are also seven large hatches on the spar-deck, not including the engine and fire room hatches. Of these the greater proportion, viz, four, are *abaft* the engine-room, where the ship is well lighted and ventilated, while in the *forward* part of the ship both of these life-giving forces are seriously abated. The large sailing-launch, occupying its frame over the two forward hatches, ought to be removed and the launch carried on the rail opposite the steam-launch. A frame could be erected in its stead for stowing purposes and keep out less light and air. In double-decked ships this launch carried amidships is a most serious obstruction to light and ventilation. Donkey-engines make the question of hoisting or lowering launches at the davits in the large ships of the Pacific Steam Navigation Company a very trifling affair. When they come to anchor, one of these launches has steam, and if needed is lowered into the water and at once steams away.

This ship is heated by means of steam-pipes, and is perfectly comfortable in every part in cold weather.

*Water.*—With but few exceptions during the whole cruise we have used distilled water. Water was obtained from the Pacific Mail Company at Panama during a stay of over four months, and used with no injurious effect. The supply came from Taboga Island.

On the west coast of South America the water is not usually good. That from Arica and Moliendo, in Peru, is the best on the west coast. At the former place it is pumped from wells situated near the beach. At the latter it is conducted down from great altitudes in iron pipes, which are broken at short intervals. The source of this supply is about 80 miles distant

from the sea-coast, and the pipes were laid by the American engineers who are constructing the railroad to Cuzco.

The water-supply at both Valparaiso and Callao must be received on board with great caution. The chances are so few for getting good water at these places that we rejected it altogether. In both of these places the source of water is a surface drainage, and never fails in both organic and inorganic impurities in my experiments with it. That in Callao does not come from the Rimac River. That which supplies Lima is derived from the adjacent mountains, and is of a better quality. The source of water which is supplied to ships in Callao is a spring which is situated about half-way between Callao and Lima. The only supply for this spring is the water which percolates through the soil from the waters of irrigation which supply the alluvial plain between these two cities. In fact, the drainage from Lima itself flows down on this plain. The water contains magnesia and lime in abundance in addition to the organic impurities.

In Valparaiso the water-supply is becoming yearly a matter of grave importance with the increasing population. Good water in the dry season is obtained with great difficulty, and in small quantities. It comes from different points up the mountain's side, where it is collected in wells and in small reservoirs. They have in contemplation an abundant water-supply, which is to be conducted down in large iron pipes from the valley, beginning near Limache, about forty miles distant. At present ships are supplied by water-boats which receive water from the wells located near the beach at the lower part of the city. Coming from such a source, it is filled with organic impurities and magnesia, and which are more abundant in the dry season from November to May.

On our way to California in this ship, water was taken on board from this source, and in twenty-four hours after there were

20 or 25 cases of cholera morbus, followed by a severe diarrhœa. The water being examined (this having been omitted for some reason when the water came on board), it was found filled with organic and earthy impurities. The water was not used any more for drinking, and no further cases occurred.

At that time, October, 1873, I addressed a letter to the bureau regarding the water-supply at Valparaiso and its present unpotable character, of which the following is an extract: "Within twenty-four hours almost every one suffered from cramps or diarrhœa. Upon examination, it was found to contain organic and earthy impurities, reducing a proper solution of the permanganate of potash. In a test-tube, upon boiling, a precipitate was formed on the glass, showing the presence of lime or magnesia. When a small piece of caustic potash was added to the boiling solution it became instantly turbid from a development of magnesian salts. The amount of magnesia did not seem enough to account for the enteric disorder, as an imperial pint contained only about 40 grains of the salt. The organic matter decolorized the standard solution of permanganate of potash, and was in sufficient quantity to produce the effect so extensively experienced."

This acknowledged impurity of water at Valparaiso makes it an excellent field for the practice of medicine on shore. Typhoid fevers, diarrhœas, and dysenteries prevail, and the practitioners are usually very successful in their treatment. Frequently, however, little else is required than a withdrawal of the cause or a supply of distilled water. Heroic doses of ipecacuanhua are praised as most successful in their dysentery cases. Most of the residents of Valparaiso have their drinking-water carried to the door in kegs holding about five gallons each, and on the backs of donkeys. These trains of donkeys, carrying water from a long distance into the city during the latter part



of the dry season, form a scene which is now quite characteristic of Valparaiso, as it is of Payta in Peru.

In consequence of the impurity of the water formerly supplied to ships in the Navy, diarrhœas, dysenteries, and typhoid fevers were a common scourge in the service. During the year in question, on the west coast, although this ship cruised where these were the prevailing diseases on shore, they constitute in the annual list of diseases but a very small percentage of the cases under treatment. These few were those whose liberty on shore, or fresh food after long confinement to salt, provoked the disease, if such it might be called. The best evidence of this fact, that distilled water is the great boon to the sailor, may be seen by reference to the table of diseases, by Surgeon H. C. Nelson, above referred to, where the total number of deaths for *two years* in the *whole Navy*, from both dysentery and diarrhœa, in any and all of its forms, were but five. In the old sailing-sloop John Adams, in China, for only a period of eighteen months on the station, in 1859-'60-'61, we had *seven deaths* from the use of river-water, beside as many more permanently invalided. The use of distilled water may be said to have swept the above from the list of diseases formerly so commonly endemic on board ship. No more lying in rivers for the sailor, drinking in poison, or going to sea for a sixty or eighty days' passage, to live on putrefying water fermenting and unfiltered, and with the sapient information that it would be the best water in the world as soon as it ceased fermenting! The word "fermentation" suggests an alcoholic result, and may have given birth to an idea of increased value of the water, even were this obtained from the germs of disease. We are now blessed with clear, pure water, which from well-constructed condensers gives no precipitate with nitrate of silver, and less frequently contains organic matter. Sometimes, however, it does, and to these instances it may be well to refer.

While this ship was at Valparaiso, where she had been lying about five months, the condensed water came over smelling and tasting like fish-oil. A careful examination of the water alongside of the ship, after being satisfied that no foreign matter had found its way directly to the tanks in the hold, showed that a coarse red sea-weed covered with animal life was secreting this volatile fish-like oil, which, from this character, upon going into the boiler, was immediately carried over with the steam into the condensers. The same thing occurred at another port (St. Catharine in Brazil), but *never* at sea. Had this water been properly exposed by using auxiliaries to secure proper aeration and oxidation, an instant disappearance of this flavor might have been expected.

The present fresh-water condensers need a few words. Having been shipmate with several fresh-water condensers imperfectly constructed or made on bad principles, months elapsed without being able to obtain water sufficiently free from salt to be potable, notwithstanding persistent efforts of the engineer officers to remedy defects. An entire absence of cloud on adding a saturated solution of nitrate of silver is not expected and seldom attained. But we can expect water which, when drunk, will not create an increased thirst. Those condensers which were made so that the steam passed through a large number of straight tubes were never perfect, as each short tube had two joints. This ship is at present provided with condensers consisting of a coil of tinned copper placed within the condenser-box, and of course is provided with but two joints. From these we have had excellent water during the cruise, with exceptional instances. Four of the latter would, however, be much better than two, in case of necessary repairs or increase of condensing surface required.

Our capacity for making fresh water as ordinarily practiced is 1,400 gallons daily. The tank capacity of the ship, of 6,000

gallons, is entirely too limited. Using 500 gallons daily, this would give but ten days' supply, as it would not do to reach complete exhaustion nearer than 1,000 gallons. This requires that the condensers shall be in operation about one-half of the time, that is to say, six days to fill them and eight days to use all the water. A ship of this size should have water-tank capacity of 12,000 gallons instead of 6,000. This would give every one an abundance of well-aerated drinking-water.

I believe that engineers will agree with me that the fresh-water condensers are placed too low down in our ships. The spar-deck on the top of the fire-room hatch is the place for one set, so that the condensed water may have a fall of about twenty feet. By this fall, if made over a properly-arranged surface, like a set of tin pans with perforated bottoms, one above the other, or through such an aerator as is figured in the Bureau's Sanitary and Medical Report for 1873-'74, page 501, the necessary exposure of the water to the air would be secured. By having the condensers in such a position, high above the steam-space in the boilers, the salt water would be less likely to go over with the steam on account of rolling of the ship. The excessive rolling of this ship obliged us to stop condensing, even after the water in the tanks had unfortunately become largely impregnated with salt. The deepest roll yet observed was that indicated by the pendulum on the break of the poop of  $47^{\circ}$  one way and  $48^{\circ}$  the other, from a perpendicular.

Another evil which needs correction is that of condensing water from the main boilers without filtration. Under these circumstances the water contains oil which comes over from the engines through the main surface condenser, on account of the high steam-pressure temperatures which reach the boiling-point of oil, whereby it is volatilized and carried directly to the water-tanks. Before going to the tanks all such water should be passed through animal-charcoal filters. The whole

subject of distillation and storage of fresh-water supply in the ship needs more especial attention, and which can only be properly given when the ship is fitting for sea. A bath-room, accessible to the wardroom and provided with fresh water from the distiller, should be added. This could be arranged so that a bath-tub to be used for salt water might be ordinarily used, and this supplemented by a reservoir supplied with fresh water and placed overhead between the beams so as to be used in the form of a shower-bath. No better plan could be devised for the economical use of fresh water than by using the salt water for a plunge-bath and the subsequent use of the shower-bath with the condensed water.

*Food.*—The food provided at sea was the ordinary Navy ration. In port fresh provisions and fresh bread were provided twice a week, or even daily in some instances. The evening ration of good *black* tea should be supplied as formerly. The last meal in the day ought never to be served before 5 o'clock. It is common to serve the three meals so that they are crowded into eight hours. As a rule the men do not care for the present preserved beef in cans. This, in my opinion, is in consequence of not having it properly cooked, as the can is usually opened and the meat eaten cold. No better reference can be made to the matter of improvement in serving this fresh beef than to describe the plan adopted by Captain Lowry on board the apprentice-ship *Sabine* in 1866 at New London. The naval apprentices on board complained of this part of their ration and did not know how to make use of it. They were required to contribute, each mess its share of beef, flour, potatoes, and onions. These were properly prepared and then placed in the coppers. First there was a layer of dough, next a layer of beef and onions, next a layer of dough, next a layer of potatoes, and another layer of dough. In this way the coppers were "built up" full. Water was added in sufficient quantity

until the whole was thoroughly cooked, and even browned by allowing the water to get a little low. This produced a true sea-pie, and was enjoyed by the apprentices, who pronounced it excellent. There is no reason for not always treating this canned beef in this way on board of any and all ships. At the present day all of the messes are encouraged to buy onions and potatoes for sea-stores, as well as extra flour.

I am convinced that the present manner of putting up butter could be vastly improved for the Navy ration, and men and officers might have from our own dairies the best of fresh butter at sea always. In order to accomplish this much to be desired object, the butter should be put up in tins in June, and carefully sealed and painted. If good and sweet *at the time* it is put up, it will be so when it is opened. Proper inspection immediately after delivery would decide this question. Contractors should be required to submit it to a rigid inspection, so that no deteriorated butter, from having been long on hand in barrels in the cities, should be passed. All of the navy and ship messes over the world, beside the residents of the tropics, of European origin, now use what is known as Copenhagen butter, and which is put up as above. Upon opening one of these cans the butter is found as fresh and sweet as when it was first put up, even if two or three years old.\*

Our sea-bread should also be put up in tin boxes. Heretofore, during different cruises, I have uniformly helped to condemn enough bread to supply tin cases for this purpose for the whole cruise. Were supplies of bread furnished in this style of packing, the crew would always be sure of having fresh crisp

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\*Since the above was written a change from the old manner of putting up the butter ration has been effected through Pay Director Cutter, the present intelligent Paymaster-General of the Navy, upon representations made to him by myself and others. The U. S. Army have also adopted the same plan.

bread, absolutely, at all times, free from worms or weevils. The hygienic advantages of such a supply can hardly be overestimated. The results of our present bake-ovens are not altogether satisfactory, as, perhaps, from incompetent bakers, the soft bread is too often heavy and indigestible. This oven is used, beside, as much for cooking extra dishes for the men as for baking bread, and the revenues from these, which formerly went to enrich the ship's cook, are now realized by the baker.

*Clothing.*—This seems to require little attention except in the range of prices, which seem to me too high. The shoes, particularly, need improvement in shape as well as reduction in price. No fault is found, so far as I know, as to the "texture or durability" of the clothing.

#### GENERAL HYGIENIC CONSIDERATIONS AND SUGGESTIONS.

The life of a man or officer on board a vessel of war is, in varying degrees, an artificial one. Those who are exposed to sun and rain on deck often experience an amount of exhaustion which is in great disproportion to the actual exertion, on account of existing subtle influences, and which too often result in disease. In like manner those passing their lives in the interior of the ship, whose duties do not require them on deck, are victims of the wearing influences of impure air and sedentary lives which a course of years will not fail to impress upon the features, or so direct the pernicious influences as to result in organic mischief. In either of the above conditions we find the most valid beginnings of disease, and the varied infirmities resulting from a long naval career may too often be traced to the above origins without being able to point definitely to any particular occasion when one may have been exposed. This deprivation of light is a denial of one of the most powerful of the vital forces, resulting in an etiolation commonly accompanied by organic disease.

The weariness of a depressed vitality with which every one awakens on board ship after a night in a confined space where the air has stagnated and been rerespired through the whole night, is familiar to any one who has ever been to sea under battened hatches. The temperature of one's body, taken after such a night of torturing dreams, is increased by one or two degrees above the normal temperature. I have repeatedly taken these temperatures under such circumstances, and allowing for the increased temperatures of the tropics in animal life, have observed 99° and 100° Fah. by the lingual thermometer. This simple experimental fact ought to be enough to lead to continued effort to improve, if possible, the present abominably ventilated ships of our Navy.

Why should we not have hollow iron lower masts? Why should not steam be used for ventilation if vessels must be crowded so that each man can have but 70 or 80 cubic feet of air-space? If, in years past, because 50 or 60 cubic feet of air-space, or any other number, the result of a guess, was thought enough for each man, is this not a good reason for reform on well-established principles? Have we no records of disease which originated from such conditions of stagnation of foul air? Should not every part of the ship, in all of its appointments, except in matters of engines and ordnance, in these days, be made to yield to every other part that consideration which its importance demands? Would not our ships, during the heat of summer in the blockade off Galveston and Mobile, during the war, have been more healthful had some provision been made for ventilation during their construction? Every one who experienced it remembers in those times the closely hooded hatches at night, to cover the interior lights when the ship rolled, when but a small hole was left for fresh air. For another war the same evil remains unremedied. The usual objection which is raised against change does not certainly apply, that it is ques-

tionable whether all reforms are improvements, and it is difficult to decide what usages are evils, and, if determined, to agree upon the surest and most practicable remedies. Better to do and dare a failure than not to do at all; for an intelligent activity is rewarded in the *beginning*, and bestows protection from everything but harmless criticism.

The "heads" in our ships should be rearranged with a view of being more easily cleansed, and giving men more protection whilst they are using them. With an abundant supply of disinfectants there is no reason why they should not be improved. At night a serious evil exists when the men, in all kinds of weather, with their skins bathed in perspiration, fresh from a warm hammock, run up to the top-gallant forecastle and stand or sit in the head without any clothes beside a short undershirt. The result is always the same, of rheumatic or catarrhal affections, if nothing worse. No one expects to make a ship of war as comfortable as a hotel, but the ordinary conveniences which seek protection for men against inevitable exposure in this particular ought to be insisted on by those who have it in their power to effect this reform.

I am most earnestly in favor of having all water-closets under the forecastle, and there are no objections to this system which may not be most satisfactorily answered in its favor. Some crude notions which I entertained regarding this subject were most happily solved by the arrival at Montevideo of Her Majesty's ship *Volage*. During a visit I carefully examined her water-closets for men and officers. These are all under the top-gallant forecastle. Those for the officers do not differ from those ordinarily used.

A brief description of the latrines for the men seems desirable. These are located on both sides of the forecastle, forward of the officers' water-closets, and consist in the main of the ordinary head-box about eight feet in length and two feet wide.



It is deep enough to slant down to the lowest point in the middle of its length and give it the necessary capacity. At this central position in the bottom of the box there is a hole to the chute, which is ordinarily covered with a valve. From the centre of this circular valve a stem runs up to a lever by which it is opened and shut. A screw is arranged bearing on the head of this stem by which the valve may be screwed down *water-tight*. This is the important part of the whole arrangement. The box is kept continually half filled with water by means of an adjacent hand-pump. At proper intervals the lever is used to operate the valve, and the dejections go out leaving the box fairly free from odor. Carbolic acid is sometimes used to completely deodorize the box. Men take their turn in keeping these places clean, and there are no regular "captains of the head."

The board covering this box contains four or five holes, and the seat is divided into as many separate compartments, for purposes of privacy, by means of iron folding shutters or doors, which are thrown back when the seat-board is thrown up just before hoisting the valve from its seat. Urinals, two or three in number on each side, are provided forward of these latrines, emptying into them, and also two large wash or bathing tubs for the use of the men. The objection that officers' smoking-quarters may be thus too much occupied, may be answered by removing them to a more agreeable part of the ship aft, or allowing smoking under certain restrictions of time in the ward-room.

The sick-bay of the Volage also contains a water-closet similar to that in this ship, and a most important addition of a bath-tub with a supply of hot and cold fresh water. The hot water is obtained by turning on the steam into a small iron water-tank which is placed over the bathing-tub between the beams. The sick-bay cots are suspended on upright iron stanchions.

They are of iron frames finished with canvas, and are most of them kept in constant position for immediate service.

The *marines* on board of this ship have been in her such a length of time, that their mental condition in some instances and moral tone would be necessarily greater than that of average strength, were they not seriously affected by this long confinement. There are now on board seventeen marines who joined the ship in Philadelphia in 1872 as part of the complement of the ship, and will have been five years on board in November of this year, 1877. The seamen and others of the crew have been changed once in this time. This very protracted life on board, with a knowledge that their shipmates left the ship two years ago, causes naturally a semi-hopeless, demoralized condition, which tends to divest them of that soldierly spirit and action for which they are celebrated. While laboring under such depressing influences it is but just to state that the marines were most active and efficient in the performance of their duties. But why should marines be called on to bear the fatigue and demoralizing tendencies of a protracted cruise of five years, which the length of their enlistment allows, while a seaman may be less than three years in a cruising ship?

The peculiarities of ship-life bear alike on all men, whether seaman or marine, and as I believe that when a man makes a short cruise he becomes less dissatisfied with a ship and more willing to go to sea again, such protracted confinement in future should be corrected by a general order requiring that the marines should be relieved when the seamen are, or at the end of three years, on board ship. The rigid observance of this order would in no little contribute to the happiness and efficiency of a most important part of the Navy.

A material increase of the pension-list, admissions to which are made from all parts of the service, may be prevented by carefully removing all well-known enfeebling influences which

may unnecessarily expose men to disease. Among these, the confinement to an artificial life on board ship, at one time sleeping in vitiated air, or on post in a confined hold, in the storm or blistering sun at others, with pangs at times of a demoralizing and depressing nostalgia, must not be overlooked in keeping a man five years in a ship of war.

When vessels of our service shall be so constructed that the heavy beams and knees, which now so seriously occupy the air and living space on the berth-deck, shall be abolished, I know of no one thing which will improve the moral condition of the sailor so much in his daily trials, with few conveniences and no comforts, as the erection of tables on which to take his meals or read or write, with benches to sit on while so doing, like a civilized human being. Captain Simpson, while in command of the *Omaha*, had these supplied as soon as he assumed command of that vessel. But the comfort and civilizing influences of these things will not be realized unless ports be introduced into the side of the ship, 20 by 14, inches to admit light and air. With these, lockers should be made along the side of the ship, in which every man might keep his bag of clothing under lock and key. When such provision shall have been made for the comfort of the seaman it will be an advance in the service most truly beneficial to the moral and hygienic conditions of a sailor's surroundings.

The present clothes-bags are unsightly and disfiguring to the whole berth-deck. The cheerful character that this part of the ship assumes when these bags are covered with white canvas for a Sunday morning's inspection conveys some idea of what smooth white walls would be as a permanent thing. It is difficult to estimate the value of smooth walls on the berth-deck as auxiliaries to ventilation, and the value of reflected light to etiolated inhabitants of this same part of the ship.

In October, 1874, I addressed a letter to the Surgeon-General

setting forth the necessity of authorizing the commanding officer to leave Panama, where this vessel had been lying nearly five months, in case the medical officer should so recommend on account of yellow or other highly congestive fever making its appearance on board ship. The test I recommended for the departure was that the moment that albumen should appear in the urine, on account of any existing fever, this cause should be considered sufficient.

The Secretary of the Navy favorably regarded the representations of the intelligent Surgeon-General, and Rear-Admiral Worden received orders from the Secretary of the Navy, dated 20th of December, 1875, to speedily depart in case yellow fever should make its appearance. This should be embodied in some department regulation regarding all yellow-fever ports, and thus save additions to the pension-list. Such an order exists in the British navy at the present time, so that upon the representations made by the medical officer the captain at once takes his departure for higher latitudes and colder weather.

The latest investigations regarding the virtue and power of carbolic acid, if properly atomized and distributed to every part of the ship, for destroying yellow-fever germs, makes one feel how important to every ship would be in such times the steam atomizer of Surgeon H. M. Wells, U. S. N. Two, or even four, of these should be placed on board of every steamship or vessel carrying a steam-launch. The results of experiments with carbolic acid in arresting the spread of yellow fever in New Orleans in 1873 are so conclusive as to almost amount to a demonstration that we have in our possession this remedy, which, if properly used, will strip this pestilence of its dreadful features, thus adding another laurel to the conquests of science. Dr. Perry, who was quarantine physician at New Orleans, wrote, in 1872, an article, which was published in the New Orleans Medical and Surgical Journal, entitled "Quarantine without obstruction

to commerce." This article, which advocated destructive disinfection of vessels, contained an account of experiments, which might be studied with advantage by naval officers. It never received the attention it deserved.

I omitted to mention an important improvement in the Volage in connection with her berth-deck ventilation and consequent comfort. There were no bulkheads around the fire-room hatch on the berth-deck, as is usual in our ships, thereby depriving us of all this air-space and free approach of pure air. Instead of bulkheads about one-half of the hatch, taken from the middle of its length and surrounding the base of the smoke-pipe, is occupied by what might be called an inverted hopper. This rises from its lowest point at the coaming of the hatch to a point about three feet up the smoke-pipe, where the heated gases from the fire-room are discharged into the casing of the smoke-pipe or the pipe itself.

No gases rise from the fire-room upon the berth-deck through the open part of the hatches, as these follow the natural or created currents through this inverted iron hopper, whilst the fresh air from the spar-deck falls down into the fire-room and berth-deck. The working of this arrangement is entirely satisfactory, to the great relief of the berth-deck. This iron hopper could be improved by covering it with gypsum and hair, thereby completely cutting off all heat that might be transmitted by radiation to the berth-deck.

I also omitted to mention, regarding the sick-bay of the Volage, that the bathing-tub and lavatory were in the same box. The lavatory was formed by using a movable board, in which were holes to contain wash-basins, and which was placed inside of the tub or box some inches below its upper edge. Finally, although the sick-bay of the Volage contains about 300 feet less of air-space than that of the Richmond, the ventilation was infinitely superior on account of the four large square ports it is

supplied with, 20 by 14 inches, admitting abundant light and air.

*Climatology.*—In this ship, during her cruising, we were not able to take extended meteorological observations of the external air with regard to any fixed geographical point. Temperatures and pressure taken on board could only be useful in relation to the ship herself in her moving capacity. These observations, on a foreign station, would be more reliable if it were possible to obtain them from shore or where instruments are provided for keeping them accurately. No reliable information of this kind could be obtained from the shore on the station. We were, therefore, obliged to take those kept on board the *Onward*, a permanent store-ship at Callao, and more valuable for position and accuracy than any others. The following is an abstract of the meteorological record kept on board that ship, and for which I am indebted to Assistant Surgeon A. C. Heffinger:



*Medical topography.*—Under this head I shall confine myself to the notice of some of the peculiarities of the west coast of South America, wherein we may find that disease is decidedly influenced by these climatic and physical peculiarities.

Touching the matter of describing the several places on the coast, in order to point out what is found peculiar to each in a medical view, would require a detail that cannot be introduced here. They all have some characters in common as to climate in certain sections of latitude, for one part of the Peruvian coast does not differ materially from all the rest. It is all a barren desert, with the exception of those few points which are watered by small streams which are large enough to reach the sea-coast from their source in the melting snows of the Andes.

The peculiarities of the climate of the west coast enable one to divide it from Panama to Cape Horn into three parts. These are marked by well-defined points of change in the matter of total or partial absence of rain. The first of these divisions would extend from Cape Horn to Coquimbo, in Chili; the second, from Coquimbo to Cape Blanco, the most western point of Peru; and the third, from Cape Blanco to Panama.

That part of the coast lying between Sandy Point, in the Straits of Magellan, and Coquimbo, is subject, in its northern extent, to a dry and a rainy season, which extends as far south as some point between Valdivia and Chiloe Islands. Rains of alternating mildness and severity prevail throughout the southern extent of this coast during the entire year. The immense precipitation of water on this coast is caused by the great height of the Patagonian Andes, which arrest the counter or upper current of the southeast trade-winds. These great altitudes are plainly visible in passing through these western passages. Mount Burney, the highest peak, stands boldly prominent, covered with ice and snow, and seems capable of squeezing dry the water-laden clouds which come down hot and fresh



from the north and west. It is a well-known fact that the precipitation along the west side of these Patagonian Andes is something enormous. Captain King, R. N., found a fall of 13 feet of water in forty-one days! On account of this vast quantity of fresh water, Mr. Darwin, in the *Beagle*, found the water along these channels quite fresh. In our passage through we were favored with clear, pleasant weather, and even strong eastwardly winds. From the Gulf of Peñas to the Straits of Magellan, in these western passages, we found the density of the sea-water and temperatures at the several points named, as taken by Lieut. S. W. Very, in the month of September, 1876, as follows, the specific gravity of sea-water at 60° Fah. being 1.0272:

Stations.	Density of water.	Temperature of water.	Temperature of air.	Remarks.
Island Harbor, Messier Channel .....	1.018	45°	49°	Heavy water-fall near by.
Gray Harbor, Messier Channel .....	1.005	44½	47°	Near English narrows.
Ringdove Inlet, Richmond Cove discovered.	1.018	43½	45°	Low tide.
Puerto Bueno .....	1.021	45°	40°	Ice-fields and lofty glaciers near by.
Otter Bay .....	1.021	43½	46°	Ebb-tide.

In our passage through, the dew-point was low, on account of the prevailing winds, and of course no rain. The above air-temperatures do not indicate cold weather. The latter in these waters seldom go below 45° Fah. in the latitude of 50° south, so that in the Straits of Magellan, for one or two hundred feet above the sea-level in winter, the snows on the mountain's side disappear as soon as they fall. The freezing-point is seldom reached. At Sandy Point the governor kept a thermometric record for ten years, and it shows a range of only 23°; the highest in summer being 58°, and the lowest in winter, 35°.

Since visiting Sandy Point in April, 1867, it has grown to be

a place of some commercial importance. All the lines of steamers for the west coast, of which there are three or four, stop here. The Chilian Government has offered inducements to colonists to settle in this part of its territory, and several hundreds of Europeans have already availed themselves of these advantages, and are now clearing land for cattle-raising, &c. The town in ten years has improved much—new houses built and streets laid out. A railway has been constructed to the deposit of coal, 7 miles distant. I visited the mine. The coal is of recent geological formation. The stratum, of which there has been but one discovered, is 7 feet thick, and runs continuously through to the water on the north side of the isthmus, where it again crops out.

Our trial of this coal for steaming purposes was not satisfactory. It required about two tons of it to produce the same results as one ton of Welsh coal. The space the coal occupied in the bunkers would make it impossible to use it for a longer period than half the time which would be given if ordinary good coal were used. Its combustion is productive of abundant ash and residue and but little smoke. Such was the experience of Chief Engineer Hibbert. The mining privileges are owned by a company in Santiago, Chili. We also saw several miners, in the stream which passes the coal-mine, washing for gold, and which is found in paying quantities, even as far down the stream as Sandy Point, where it empties into the straits. The colony of La Colonia contains about two thousand inhabitants, and is no longer a penal colony.

There is a dispensary at Sandy Point and a physician, who, in addition to his practice, attends the few soldiers in garrison there. The ordinary diseases are those common in Chili, such as catarrhal affections, rheumatism, and syphilis. The doctor informed me that his practice was small, so that his income depended more on his apothecary shop and dispensary. There

are two brigs which run regularly between Sandy Point and the Falkland Islands, carrying the mails, besides a schooner which communicates monthly with the English Protestant Episcopal Mission under Bishop Sterling, on Beagle Channel, in Terra del Fuego. Two Fuegian women were at the doctor's house, who had been captured, and after teaching them it was the intention of returning them to their homes. They are short in stature, with low foreheads, thick lips, and heavy, dull expression. When I saw them they were both suffering from the effects of civilized life, in an attack of pulmonitis.

After entering the Gulf of Peñas I examined the harbors where we anchored for the Winter-bark tree. With a few scattering exceptions it was not found until we reached Port Gallant, one of the best harbors in the Straits of Magellan, and which is probably the place where Captain Winter anchored in 1578, as it is the last good anchorage for sailing-vessels in passing to the westward. I obtained two vigorous plants, hoping to carry them home, but our cruise was so protracted on the coast of Brazil that they perished from the hot weather.

At Port Gallant this *Drymis Winteri* or *Aromatica* seems to find a climate exactly suited to it. Being of the Magnoliacea, like our own *Magnolia grandiflora*, it seeks low, swampy places, near the water-level, and on rocks which are deeply embedded in moss, but prefers the even, low temperatures found at this point. The high mountains in the straits, at the bases of which it is found close to the salt water, are covered with snow most of the year, so that its green branches may be said to be bathed in moisture the year round. This on account of the freezing-point being seldom reached near the salt-water surface at these mountain bases.

Its fresh leaves are succulent and spicy, without any bitterness, and should be considered one of those aromatics which have nutritive as well as antiscorbutic properties. The latter

quality I presume it would not have except in its recent state. The leaves are filled with aromatic oil, and burn in the flame with explosive combustion. Any vessel directly homeward bound, by stopping at this port a few hours, might secure as many of these plants as desirable, and be able, with a quick passage, to bring specimens home.

The northern part of the before-mentioned southern climatic division of the Pacific coast, about Talcahuano, Valparaiso, and Coquimbo, more particularly interests us, as several months of our cruising were passed at these places. Even in winter the climate of Chili is mild as far south as Chiloe. Chili extends from the Andes to the Pacific, and has an average breadth of 110 to 120 miles. A very interesting and instructive topographical representation of the whole republic, in relief, was on exhibition at the Chili National Exposition in 1876. The whole valley of Santiago south is represented as well watered and fertile, and most of the valleys are capable of irrigation and cultivation.

North of Valdivia, which is subject to excessive rains at about Concepcion, the meteorological tables are less often changed, and the climate is more even. From this point up the valley of Santiago it is considered one of the finest climates in the world. Rheumatic affections abound, however; to so great an extent as to become the most common disease, evolving cardiac retrocession, so that, at Talcahuano, Dr. Trumbull informed me death from cardiac disease was a common occurrence.

At Valparaiso they have the regular alternations of the dry with the rainy season. The rainy season lasts about five months, beginning in May, during which time the northerly winds prevail. The hills are then covered with green pastures and flowers. The high winds, which in summer filled the air with sand and dust, are quieted, and all nature is in vigorous

activity, while the fresh balmy atmosphere carries everywhere the bounteous rain. While the seaman abandons the harbor of Valparaiso on account of its northerly exposure, those on shore welcome the advent of winter as their most joyous season, and one that is filled with invigorating influences. The insidious diseases which filled the air, or were lurking in the dry *quebradas* of Valparaiso at the end of summer, are now no longer heard of. Abundant water has corrected it all. The reservoirs are filled, and the rains have washed the air of its impurities. The vegetation which now covers the hills in every direction sends forth its volumes of oxygen to enrich the air and destroy organic matter in the form of germs of disease.

About October, the scene changes, and this part of Chili puts on its brown barren dress of summer. The grass withers, excepting under irrigation, and the high winds blow, all the latter part of the day, such fierce gales on the coast that boats are in danger of being driven to sea from Valparaiso. Without glasses during these winds, one is almost blinded by the sand and dirt which fill the air, and various ophthalmias are the result of these causes. During these times the air is exceedingly dry, and as much as 20° Fah. has been noticed as the difference between the dry and wet bulb thermometers. With this dryness of the atmosphere comes great depression of spirits. The soil is parched and cracked, and, in giving up its water, the various diseases, depending upon the bad quality of the greatly diminished supply, make their appearance, and which were referred to when noticing the *water-supply* of Valparaiso.

With all their immediate distressing effects, however, these high winds are called their "doctor" by the residents of Valparaiso on account of their temporary invigorating effect. This value consists in bringing in a small amount of moisture by which the extreme dryness is relieved, and by which ozone, to some extent, is transferred from the sea-coast inland. The

freshness in the air is certainly apparent in the evening after these high winds have ceased, and its consequences are observed in an increased exhilaration and flow of animal spirits.

The same unfavorable conditions furnished by the dry summer at Valparaiso are felt at Santiago, where the hygrometer is even more steadily lower. At the latter place typhoid fevers and dysenteries are the great scourges, and may be clearly traced to water contamination and imperfect drainage, as well as from insufficient water to wash the sewers of the city. During the summer months all of the inhabitants of Santiago who have the means flee to the heart of the Andes or to the sea-coast. All of the air seems void of moisture. The dew-point is so low that the skin is hard and dry; the hair is stiff and hard; and a most uncomfortable thirst overtakes one recently arrived, which might be highly valued by one who would seek a legitimate excuse for imbibing more than ordinary.

At Coquimbo, the next port north of Valparaiso, the rainfall is little or nothing, and this is the most northern point of latitude of rains in Chili. Here, also, the water is scarce and poor, being just on the edge of the great desert of Atacama, which extends north from this point about 1,500 miles.

The fact that syphilitic diseases were found by us so abundant in these places in Chili may be explained to a great extent by want of cleanliness, and the latter in consequence of this diminished water-supply. Besides this the habitual ablutions of the lower classes in Chili are not as frequent as the present state of civilization demands elsewhere. Whatever may have been the cause of this great amount of venereal disease, it is certain that both the cruising ships of this squadron were furnished with it at these places in Chili.

After leaving the south, recovery from these affections would scarcely take place before our return, when fresh infection would be supplied. We never gave general liberty at Valpa-

raiso, Talcahuano, or Coquimbo that a certain large percentage of the men were not affected with venereal disease, and which was not the case elsewhere on the coast. In fact, the amount of venereal disease seemed always in inverse proportion to the water-supply on shore.

I have made several tables, giving an incomplete list of all those on board our ship who suffered from the varied forms of the disease, with a view of showing the periods of incubation. These are imperfect, also, because the medical journal is not kept with a view of furnishing this important information. In the main, however, they are correct as to dates and periods.

TABLE 1.—*Bubo*.

Name.	Rate.	Date of first presentation for treatment of bubo, with or without previous history of chancroids.	Number of days which had elapsed since last exposure on shore. Taken from liberty-book.	Remarks: condition of glands, &c.
			<i>Days.</i>	
F. B. ....	Marine .....	Oct. 11, 1874	28	Indurated.
W. T. ....	Seaman .....	Oct. 16, 1874	25	Do.
J. B. ....	Landsman .....	Oct. 25, 1874	32	Do.
D. McC .....	Seaman .....	Oct. 25, 1874	30	Do.
J. H. McC .....	Ordinary seaman .....	Oct. 27, 1874	32	Do.
H. S. ....	Landsman .....	Nov. 5, 1874	41	Indurated and disappearing.
A. McG. ....	Engineer's yeoman .....	Dec. 5, 1874	70	Full suppuration and was incised.
T. C. ....	Landsman .....	Dec. 8, 1874	71	Do.
J. E. ....	Cooper .....	Mar. 27, 1875	22	Indurated.
N. T. ....	Seaman .....	Apr. 6, 1875	36	Disappearing.
C. H. ....	do .....	Apr. 28, 1875	51	Full suppuration and was incised.
R. W. ....	do .....	Apr. 29, 1875	54	Disappearing.
P. B. ....	Ordinary seaman .....	May 2, 1875	15	Do.
E. M. ....	Ship's cook .....	Aug. 20, 1875	39	Indurated.

Average number of days when bubo became an object of treatment, 39.

TABLE 2.—*Gonorrhœa.*

Name.	Rate.	Date of first presentation for treatment of gonorrhœa.	Number of days which had elapsed since last exposure on shore.	Remarks: where contracted, &c.
W. L.	Marine	Feb. 13, 1875	<i>Days.</i> 4	Contracted at Talcahuano.
F. H. B.	Landsman	Mar. 7, 1875	2	Do.
W. B., 2d.	do	Mar. 8, 1875	7	Do.
G. B.	do	Mar. 15, 1875	2	Do.
W. McC.	Wardroom boy	Mar. 18, 1875	4	Do.
C. D.	Ordinary seaman	Mar. 22, 1875	8	Do.
J. B.	Landsman	Mar. 17, 1875	4	Do.
W. F.	Ordinary seaman	Apr. 8, 1874	16	Contracted at Talcahuano; treating himself.
J. R. D.	Landsman	Apr. 23, 1875	9	Contracted at Talcahuano, Chili.
M. B.	do	Apr. 24, 1875	4	Do.
F. M.	do	Apr. 25, 1875	7	Valparaiso.
A. J.	do	July 15, 1875	4	Callao.
E. S.	Marine	Jan. 11, 1876	11	Valparaiso.
H. S.	Landsman	Jan. 21, 1876	11	Do.
T. McG.	Ordinary seaman	Jan. 23, 1876	8	Do.
J. R.	Steerage cook	Mar. 11, 1876	7	Do.
G. A.	Landsman	Apr. 24, 1876	2	Coquimbo.
T. McG.	Ordinary seaman	Apr. 20, 1876	3	Do.
J. R.	do	May 7, 1876	7	Do.
J. C.	Boiler-maker	May 18, 1876	14	Do.
G. W.	Sergeant marines	May 21, 1876	15	Do.
J. T.	Ordinary seaman	June 1, 1876	7	Callao.
W. H.	Landsman	June 3, 1876	4	Do.
N. McG.	First-class fireman	July 23, 1876	5	Do.
J. T.	Ordinary seaman	Sept. 18, 1876	3	Do.

Average number of days indicated above, 6½.



TABLE 3.—*Chancroids.*

Name.	Rate.	Date of first presentation for treatment of chancroids.	Number of days which had elapsed since last exposure.	Remarks: where contracted, &c.
			<i>Days.</i>	
J. T. ....	Ordinary seaman .....	Feb. 20, 1875	6	Talcahuano.
D. M. ....	First-class musician ..	Mar. 14, 1875	16	Do.
G. S. ....	Ordinary seaman .....	Mar. 12, 1875	16	Do.
A. A. Z. ....	Seaman .....	Mar. 26, 1875	12	Do.
J. F. ....	Ordinary seaman .....	Mar. 19, 1875	13	Do.
T. A. ....	Landsman .....	Apr. 9, 1876	18	Do.
D. R. ....	Marine .....	Aug. 7, 1875	19	Valparaiso.
R. G. ....	Ordinary seaman .....	Apr. 20, 1875	5	Do.
J. R. ....	First-class fireman .....	Jun. 7, 1876	7	Do.
G. S. ....	Ordinary seaman .....	Jan. 10, 1876	6	Do.
A. F. ....	do .....	Jan. 12, 1876	10	Do.
P. S. ....	Marine .....	Jan. 20, 1876	5	Do.
C. S. ....	Landsman .....	May 5, 1876	5	Coquimbo.
C. S. ....	do .....	Feb. 10, 1876	6	Valparaiso.
C. C. ....	Ordinary seaman .....	July 28, 1876	5	Callao.
C. G. ....	Marine .....	July 29, 1876	8	Do.

Average number of days slightly less than 10.

TABLE 4.—*Chancre.*

Name.	Rate.	Date of first presentation for treatment of chancre.	Number of days which had elapsed since last exposure.	Remarks: where contracted.
			<i>Days.</i>	
J. W. ....	Seaman .....	Apr. 26, 1875	51	Talcahuano.
C. H. S. ....	Landsman .....	May 13, 1875	11	Valparaiso.
W. G. ....	do .....	May 22, 1875	18	Do.
H. W. ....	Ordinary seaman .....	July 14, 1875	71	Coquimbo.
J. O. F. ....	Marine .....	Jan. 21, 1876	17	Valparaiso.
W. S. ....	Landsman .....	Feb. 11, 1876	22	Do.
C. A. ....	Marine .....	Feb. 5, 1876	20	Do.

Average number of days since last exposure, 30.

A standard table for use in the whole service, to accumulate statistical information, might be constructed, and more valuable than either of the above, in which the total incubation of the disease might be given from the date of last exposure to the appearance of the secondary eruption. I am unable to get at

these periods for the several cases on board of this ship of systemic disease, as the liberty-lists for the earlier part of the cruise have been lost. To accurately gain this important information it will be necessary to make a special record at the date of admission as to the time the patient was last on shore. This, taken in connection with the liberty-lists, and all the information possible to be gleaned from the patient himself, should be tabulated and forwarded at the end of the quarter under the following heads, viz: Name; Rate; Place; Date last on shore from liberty-book; Other facts as to date from patient himself; Number of days of incubation for chancre; Number of days of incubation for glandular indurations; Number of days for secondary eruption.

The worst case of those in Table 4, the last one enumerated in the list, was finally invalided and sent home. His exposure was on February 5, and the eruption and other secondary symptoms appeared the 10th of March, making a period of 33 days. This terminated in a very severe syphilitic rupia covering the whole body, and also involving the endocardium.

The other cases on Table 4, of 51 and 71 days, seem to so exceed the average that there may be some error. It is probable that the men may have gone on special liberty more recently than the day given in the liberty-lists, and of which no record could be found. This error in any systematic plan which may be adopted for keeping a record of syphilitic disease could be corrected by carefully questioning the man when he was admitted on the medical journal.

*The chabalonga, or fever of Coquimbo.*—Before leaving Coquimbo it may be well to refer to a rather peculiar continued fever which became epidemic among the officers who went on shore while the ship was there, and from which nearly all suffered. To the nearly one hundred and fifty different names which have been given to fevers on account of peculiarities or

geographical position, it seems unnecessary to add another. This was, perhaps, an "ardent," "bilious," or "gastric" fever. By the natives it is called the chabalonga, being by them well recognized as belonging to that part of the country. But it has its peculiarities as a continued fever which forbid its classification with the above.

In encountering this fever its terrestrial origin was apparent. None of the men were affected by it, as none went on shore. At the same time, old residents suffered from the disease on shore who had never before had it, thus showing in our epidemic a very active poison.

The positive origin of the disease is not easily determined and must be left to rational deduction. As the usually effective power of quinia in controlling paludal fevers absolutely failed in this, the fact becomes a therapeutic test that the poison does not resemble that of ordinary marsh malaria. This same test has been applied to what is known as Oroya fever in Peru, where there is a supposed admixture with the cause producing verrugas, and where quinia also failed. The failure of those terrestrial conditions which usually generate a fever poison that yields to quinia anywhere adjacent to our anchorage would contradict this origin. The only land which is watered at all lies in the direction of La Serena, the nearest of which is two or three miles distant. The promontory on which Coquimbo is situated is formed by high rugged rocks, and all the adjacent soil is high and is formed of shells and dry earth. Could this parched soil become the origin of a fever poison when operated on by the prevailing natural agencies of high winds and hot suns?

Denying this source, the only other apparent cause was the food coming from the valley of La Serena. The fruit was abundant, and particularly the grapes, but which were eaten

by all. One attack of the disease affords no protection against another.

*Symptoms.*—This is an autumnal continued fever, and is not, like remittent or intermittent fever, under the controlling influence of quinia. The autumnal months of April and May are regarded as the natural season for the appearance of the fever. In all there were thirteen cases of this fever on board the Richmond. It begins by the usual lassitude and disinclination to sit up. The chill is usually severe at the outset of the disease, and attended with severe pains in the back and loins. The pyrexia is attended with severe symptoms, a dry skin, and heavily-furred tongue. The temperature reaches a maximum of  $104^{\circ}$  to  $105^{\circ}$ , and the pulse 120 to 140 per minute. Urgent thirst and great exacerbation of fever in the afternoon, continuing until toward the following morning, when a defervescence occurs, and sleep follows or attends a most profuse perspiration. The urine is high-colored in the earlier days of the fever, copious, and with a specific gravity of 1.029. It is abundantly filled with amorphous deposit of urea and with epithelial scales. As the disease continues, the periods of relief during the night from the fever are longer and more decided, the profuse perspiration leaving the patient exhausted, but which is one of the critical discharges of the disease.

The most exhaustive symptom of the disease was an excessive diarrhœa, which lasted through the first eight or ten days of the attack. Sometimes the stomach was intolerant. Nausea and vomiting were rare. In all of the cases a deep-seated acute bronchitis attended the disease, giving it the appearance of a catarrhal fever. Enteric fever would be suspected from these copious discharges, but of the latter no other symptoms supported the resemblance. There was no period of distinct regular remission. The whole period of fever varied from nine to thirty-four days, during which time the temperature never

rose above 105°. For such irregularity in the fever-term no cause was discovered. There was no characteristic eruption. The exhaustion attending the course of the fever made convalescence a question of some weeks. As I was a sufferer from this fever for sixteen days, I can assert from a personal experience that convalescence bestows on one a most ravenous appetite, and no dangers were experienced in indulging it within satiation, as are found under similar circumstances in enteric fever. The sequelæ of this fever are not in any manner unpleasant. Instances have occurred of tubercular disease of the lungs. The common result is, however, to enjoy a much improved condition of health after recovery from one of these attacks. The cutaneous and alvine secretions seem, as it were, to assume a new life, and this activity continues after permanent restoration of the health.

There is little to be said regarding the treatment of this fever, like a hundred others which have no special complications. Arterial sedatives and refrigerant solutions were made use of to quiet the pulse and overcome the dryness of the skin. The excessive discharges required supporting measures, so that brandy and milk-punch were freely used all through the disease. As before remarked, quinia was little used. In my own case twenty grains were administered one day, and thirty the next, with no modification of the fever, but a suspension of the chills was apparent. The normal temperature returning, the patient has passed the turning-point to recovery. Relapses are quite common, on account of the dampness of the climate and the prevailing cold winds on the coast of Chili during the months of April and May.

*From Coquimbo to Cape Blanco in Peru.*—Passing from this southern part of the station to the middle district of the west coast, viz, from Coquimbo, Chili, to Cape Blanco, in Peru, at its most western point, we enter one of the rainless regions of

the world, and which is the great desert of Atacama. With abundant rains this soil would produce all the luxuriant vegetation of the tropics. Without water this vast region stands incapable of supporting animal or vegetable life. This desert includes the whole coast of Peru, is from 80 to 100 miles wide, and runs back to the snow-covered peaks of the Andes. These melting snows create large streams of water, which of course are largest at or near their sources, and which follow down the several valleys toward the sea, but are sucked up by the dryness of the soil and air long before reaching the coast, so that they are but insignificant streams when they reach the ocean, if they are not exhausted long before so doing. Further toward the north, where the sea range of Andes is nearer the coast, these streams reach the sea in larger volume.

That point on the coast of Peru which most interests us is Callao, as at this place much of the time is passed by our vessels on the station. Whatever is peculiar regarding the climate of the Peruvian coast is fairly illustrated by that of Callao and Lima.

The climate is almost without variation of air-temperature, as may be seen by reference to the table made on board the *Onward*, stationed at Callao. It is enervating, however, and on this account a short residence by foreigners at the sea-coast is productive of relaxation and debility. There is but a degree or two of difference between the thermometer and hygrometer, so that a fall of this difference of the mercury in the unattached thermometer, at night or in the winter season, brings on those thick fogs for which Callao is celebrated. In the winter, from June to September, these fogs almost amount to a rain, as the decks are covered with water, and the awnings are always spread at night, or should be. During the winter season the sky seldom clears, and the winds seldom or never exceed a gentle breeze. Such a climate in winter requires extreme care

for one's health, in fact such care as our northern winters require. The dew-point at Callao, with a winter temperature of  $62^{\circ}$  Fah., is  $59^{\circ}.72$  Fah. The difference between these figures shows how slight a fall of temperature will produce the fogs, as these show all the water contained in the air.

The trade-winds from the South Atlantic, in crossing the regions of the tributaries of the Amazon and La Plata, being loaded with vapor, precipitate most of the water on the eastern slope of the Andes. That which they fail to yield is so thoroughly squeezed out in crossing the summit of the Andes that the western slope of the Andes is rainless, and this state of the atmosphere reaches out to sea for forty or fifty miles along the coast. But these cool winds, coming from the Andean summits of 15,000 to 18,000 feet, on reaching the sea-coast, find enough water held in vapor from the seaward winds to condense in the form of fogs.

While dwelling on the natural agencies which cause this coast of tropical Peru to exhibit a climate which is one of the most remarkable in the world, it is well to mention the strong current from the antarctic regions which sets along its shores. This current increases a few degrees in temperature as it approaches the equator, where from  $63^{\circ}$  the water suddenly rises to from  $74^{\circ}$  to  $78^{\circ}$ . So the Republic of Peru exists within the tropics between two cold walls which cause the isothermal lines to run almost north and south, and which are productive of a climate, that, while it is delightful to the senses, is gradually destructive of the vital forces. This deteriorating influence is owing as much to loss of oxygen, originating in the universal absence of vegetation, as to the persistent effect of unvarying temperature.

The clouds and fogs prevailing on the coast in winter, cease at an altitude of about 800 or 1,000 feet. The cloud stratum even descends at times, notably in the month of August, so low

and dense as to obscure the hulls of vessels in the harbor of Callao, while the masts and spars are in plain sight. This by the natives is called the *garua*. The winter skies of Callao and Lima are transferred, in summer, toward the summits of the Andes above an elevation of 8,000 feet. At this altitude in summer, rains and fogs are met with and much thunder and lightning, while at the same place in winter the air is clear and cold, and the dry air is filled with such abundant electricity as to respond to the friction of the hand and brush in brilliant sparks. One may predict with certainty that the sky is clear at Anchi, 11,000 feet up the Andes, when at the sea-coast a thick fog prevails. This is now readily determined, and in fact daily observation is made by telegraph, which now reaches to an elevation of 15,645 feet above Callao, the summit of the Oroya Railroad, and distant 104 miles.

From the above natural agencies causing a wall of cold air on either side of Lima, for instance, it is easy to understand how, on the Peruvian coast, the air is moderated by cold winds from almost any direction. From the sea comes a cool wind where the adjacent water at this latitude is 60° Fah. Thus we have, at a little more than 12° south latitude, a moderate summer temperature of from 69° to 75°. With these meteorological alternations from sea-coast to mountain-top, there is a point of unvarying blue sky and delightful temperature in summer and winter, at a place on the Oroya Railroad called Chosica, having an altitude of about 3,000 feet above Callao, and which is made a resort for invalids and others. Here we are above the fogs and below the rains, in a sort of pivotal centre.

Having now some idea of the causes which moderate the heat of summer in Callao and Lima, it will be profitable to seek the exact causes which produce the sensation of cold at these places in winter.

Persons coming to Peru without having some previous knowl-



edge of the peculiar climate of the coast, and of Lima particularly, knowing the city to be situated but  $12^{\circ}$  south of the equator, would consider it useless to provide themselves with thick winter clothing such as would be worn in Washington in winter. But they are surprised to find that from June to September they suffer from a degree of cold which calls for thick woolen clothing. Upon appealing to the thermometer one is as much surprised to find that it stands at  $60^{\circ}$  Fah., and that there is certainly a degree of cold which is keenly felt and which is not indicated by the thermometer. A Spanish writer\* calls the *cold* indicated by the thermometer *physical cold*, and that not indicated by instruments, *physiological cold*.

It may be asked, what is the cause of this disagreeable sensation of cold which is not indicated by the thermometer? The air charged with watery vapor must account for it all in a great measure. The dry, cold air of Colorado, in the United States, would have the temperature, indicated by the thermometer, that would be felt at the time, so that the feelings would be correctly indicated by the thermometric variations.

These peculiarities of variation of temperature in causing sensations of cold, even when passing to a higher temperature, are described by the above writer in his experiences among the Andes on the Pacific slope of Peru. His observations extended from an air of absolute dryness to one at the point of saturation, as follows:

"On several occasions, in the course of my long journeyings to the region of the woods, situated in the eastern part of Peru, which is the country called Montaña, I found myself on the summit of the eastern Cordillera with a cloudless sky, and at my feet were some dense vapors, which, appearing like an immense white sheet, covered the entire region of the virgin woods. Whilst above that ocean of vapors, although the tem-

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\* A. Raymondi on the Climate of Lima.

perature of the air was rather low, I did not experience much cold; but immediately that I went down, and my body was submerged, so to speak, in the stratum of dense watery vapors, which in fogs cover for a greater part of the day the zone that in Peru is called *Cejá de la montaña* (the eyebrow of the mountain), although the thermometer indicated a higher temperature than that which I had observed above, an oppressive sensation of cold invaded my whole body, reminding me of the foggy winters of Lima. At the time, I was rapidly passing from the region in which the air was cold and dry to another in which the milder atmosphere was saturated with vapor. Hence the difference between the physical and physiological cold.

"The causes operate to produce the above characters of cold, as follows: All bodies emit or expel heat until their temperature reaches that of those which surround them. Our bodies possess a certain heat of their own, which is higher than that of the atmosphere, and as all warm bodies emit a portion of their warmth in heating the air surrounding them, if the last be very cold, our bodies lose a proportionate degree of heat, so that the excessive loss is felt in equal degrees of cold. This explains the cause of the cold which has been termed *physical*, because the cold is felt in exact relation with the reduction marked by the thermometer.

"Regarding the cause of *physiological cold* we reason as follows: All bodies do not possess the same capacity for heat; or, in other words, in order to warm a definite quantity of different bodies, the same amount of heat would not be required. This happens in the two conditions of air under consideration. *Dry air* is far inferior in heat capacity to *moist air*, and, consequently, to warm a certain amount of the latter a greater amount of heat is required."

It will now be readily understood that when our bodies are surrounded by fog, they will lose a greater amount of heat, and

we shall consequently feel much colder. In case the wind is blowing, this cold air becomes almost insupportable, in consequence of our bodies continually losing heat, and the wind constantly carrying off air that has been warmed by another quantity of heat from the body. Thus warmth is continuously abstracted from the body in quantities too great to be supplied by the ordinary productive power of the animal economy.

The foregoing conclusively proves that the principal cause of the unpleasant and penetrating cold which is felt in Lima during the winter is to be attributed to the humidity of the atmosphere, which acts by *suddenly* withdrawing animal heat, and even effecting a pathological change by causing a check of the perspiration and the secretions generally.

This explanation of the pathogenic peculiarities of climate applies with peculiar force to ship-life in these same surroundings. A saturated atmosphere may be produced by excessive wetting of the berth-deck. The dew-point can be here artificially raised in a dry climate to within two or three degrees of the outside air, while the increased heat of this part of the ship causes the air to retain more of the vapor in suspension. The natural result of a fall of air-temperature is a fog or mist on the berth-deck, with the attending dangers of the physiological cold.

*The exciting cause of the epidemic of yellow fever in Peru in 1868.*—Some mention of cause and effect in the physical agencies which operated to produce the yellow fever in Callao and Lima in 1868, seems proper here. The terrible earthquake and tidal wave at Arica that year, which destroyed two of our vessels, was so alarming that little attention was given to investigating the cause or causes of yellow fever in Peru, where it caused the death, on the whole coast, of perhaps 50,000 people.

There is not within my knowledge a better-marked instance admitting of demonstration, in which the physical agencies of

nature, by their sudden and unaccountable change, were productive of one of the most fatal epidemics of yellow fever ever known.

It is proper to refer to what Maury says in various essays regarding the currents of the ocean on the coast of Peru in connection with the density of sea-water. The air of the Peruvian coast north of Callao has a temperature seldom varying much from 75° Fah. This causes, near the coast, an excess of evaporation and consequent reduction of sea-level, as well as increased density of sea-water. To supply this loss, water will be supplied from the fresher and warmer water north of Cape Blanco, where there is an excess of precipitation, and hence the occasional current flowing from these regions to the south along the coast. This current is usually found and taken advantage of by navigators.

As exhibited by the vegetation about Cape Blanco, the geographical line separating the rainy from the rainless region is quite a sharp one. The broad Peruvian current flowing northerly north of Payta, Peru, makes a sharp line, dividing the cool from the hot water, so that within a few miles about the edge of this current a difference of ten degrees of temperature is frequently found.

During the epidemic in question, which extended along the coast as far south as Iquique, 20° south latitude, the number of deaths at Callao reached 60 daily, and 250 to 280 in Lima. The temperature of the air was, for these places, most extraordinary, being increased to 85° and 90° Fah. in the shade, while the temperature of sea-water at the coast went up from 60° Fah., its almost invariable temperature, to 74° Fah.

Captain Petrie, who has for many years commanded one of the Pacific Steam Navigation Company's steamers between Callao and Panama, gave me the following account of changes of current on the coast prior to the outbreak of fever. The Hum-

boldt current, which usually sweeps along the coast, preserving a very small range of temperature, was reversed; that is to say, the usually slight inshore current set strongly south, bringing the warm water from the north of Payta, and raising the temperature of water in Callao Bay from its usual temperature of  $60^{\circ}$  to  $74^{\circ}$ , as above stated. From October to December the temperature of the air usually varies from  $64^{\circ}$  to  $68^{\circ}$ ; during the summer months from  $69^{\circ}$  to  $74^{\circ}$ , remaining steadily from  $12^{\circ}$  to  $14^{\circ}$  above the temperature of the water in the bay.

The South American Pilot says: "This river of cold water along the coast of Peru sets to the northward from a half to one knot. Yet occasionally it sets to the southward with equal or greater strength. The oldest navigators cannot predict with any certainty when the changes will occur; they only know that they occur suddenly."

The cause of this phenomenon is of no importance to us, when we know that the usual maximum temperature of Callao in summer of  $75^{\circ}$  is insufficient to evolve the epidemic of yellow fever from either an existing or an imported germ. During this extraordinary heated term, caused by the change of current, a continuous heat was maintained at Callao and Lima of from  $80^{\circ}$  to  $90^{\circ}$  Fahr., affording, by these few degrees of increase above the usual temperature, the one condition wanting in these places to evolve the fever in all of its violence. We have it pretty well demonstrated that yellow fever cannot be produced in any given place unless the usual air-temperature is  $80^{\circ}$  and above for a period of two or three weeks. Hence, to us, in common with careful observers in Callao, it seems obvious that this yellow fever was brought about by this change in the Peruvian current.

*Rarefaction of the air at great altitudes on the Pacific slope of the Peruvian Andes.*—The medical topography and climate of this west coast present many peculiarities which excite con-

tinually, in the mind of the medical traveller, an unfailing interest, on account of their direct and visible effects upon the animal economy. The climate of the city of Arequipa is peculiarly dry, on account of its situation amid the surrounding desert of Atacama, and cold, on account of its altitude of 8,000 feet. These peculiarities give the city some celebrity in both Chili and Peru on account of some wonderful cures, which are said to have occurred there, of persons who had suffered from tubercles of the lungs. I have known several apparently hopeless cases recover after a residence there of only six or eight months, and then return to their homes in Chili. The fine stream of water which runs through the city causes the soil which is irrigated by it to yield abundantly, so that the supply of good wholesome food is abundant, and which must always be taken into consideration along with other comforts when persons who are suffering from consumption of the lungs are seeking the benefits of a change of climate.

Arequipa resembles in climate another place in Peru, the town of Jauja, which is situated about 120 miles east of Lima, and beyond the western Cordillera. The place contains about 15,000 inhabitants of mixed races, enjoys a bracing climate, and is the great sanitarium of the Peruvian capital. Its clear blue sky covers this mild climate, and a temperature never varying from 50° to 60° Fah. Dr. Fuentes, of Lima, says Jauja has always been the refuge of consumptive patients, and lengthened experience has demonstrated the favorable results of this climate. The proportion said to have recovered, of the total number of patients sent to Jauja, amounts to 79½ per cent. In view of so favorable a result, the government initiated there, in 1860, a hospital for consumptives, but which never reached any degree of perfection on account of financial embarrassment.

Among other peculiarities of climate are those causing the "aire," and which are, perhaps, more strikingly exhibited in

Peru than in Chili. A most singular illustration of its effects was given me by Dr. Heath, who is the surgeon employed on one of the Peruvian railroads now building from Packasmayo to the Andes. While making the trip over this road with him, he informed me that the visible effects of this existing cause were quite common in his experience. He mentioned an incident he witnessed far up on the line of this road. He experienced, one day, as he approached a party of workmen on the road, a severe and sudden pain in his side, causing him to "double up." He, however, managed to walk on, and one of the workmen hailed him to stop and see several men who were ill, and had been taken that instant with severe pains, &c. What was still more wonderful in his statement of coincidences, but which has since been vouched for by others, was, that at the same moment he felt this pain he saw two birds, which were flying over, fall to the ground, and were picked up dead. The ordinary effects of *aire* are a paralysis of the cutaneous nerves and redness of the skin from dilatation of the capillaries. This effect on man might, if exerted upon a bird, produce sufficient shock to cause death.

It is not astonishing to see a result of this kind realized, when we consider that Packasmayo is almost under the equator. It is subjected to a temperate climate, while it is under the influence of a torrid sun. Could anything be better arranged to evolve strong electrical currents where such positive degrees of heat and cold meet on such sharp lines? The strata of air indeed, under such circumstances, must exist in various directions and in wild contortions. The most natural arrangement one would conclude to exist is that the alternating strata of hot and cold air rest, as it were, on their edges, their length running north and south, in the direction of the isothermal lines. Were such the case, the least undulation of such long flowing lines, defined by such sharp boundaries, would deflect at one time

cold and at another hot air upon an animal structure, causing violent reflex action, shock, paralysis, or, as in the above instance, the death of the birds. These intense effects, be it observed, occur usually at great altitudes, the milder effects at a lower level.

I must hasten to notice the special effects of the rarefaction of air in the localities in question upon the animal economy, as has been illustrated and most satisfactorily studied during and since the construction of the Oroya Railroad by Mr. Henry Meiggs, the only one in the world reaching the altitude of 15,640 feet. I give the following particulars regarding the effects of rarefied air from my own experience on this road, and from the written and oral statements of Dr. G. A. Ward, who has been employed professionally on the road since its beginning.

The labor employed in building this road was principally the native Peruvians of the mountains, who are a short, thick-set race called Serranos, and have immense lung capacity. Mr. S. W. North, civil engineer, made some measurements of these Serranos at Yauliyacu, an altitude of 16,000 feet, as follows:

Age.	Chest measurement.	Height.			
		Proper height in inches of twice the chest measurement. European standard.	Actual height in feet and inches, and in inches alone.		Difference, in inches.
	<i>Inches.</i>	<i>Inches.</i>	<i>Ft. in.</i>	<i>Inches.</i>	
14 years .....	36	72	4	10 = 58	14
24 years .....	36	72	5	6½ = 66½	5½
21 years .....	35	70	5	4 = 64	6
16 years .....	34½	69	5	0 = 60	9
30 years .....	34½	69	5	4½ = 64½	4½

Average difference in height between European and Serrano, 7½ inches.

This enormous increase in size of the chest is owing to the rarefaction of the air in which these natives live, enabling them to undergo an active, and even laborious, existence at these



great altitudes. American engineers employed in building the road increased their lung capacity during their labors. One of these, Mr. John Malloy, informed me that the measurement of his chest had been increased four inches in two years by exposure to rarefied air in these Andes.

This peculiarity of adaptation to the demands of nature enables these people to overcome the pains and inconveniences which are experienced by persons who ascend the Andes for the first time toward their summits, and which are known under the names of *soroche*, *veta*, *puna*, etc. These symptoms indicate a diminished supply of oxygen, but more particularly a diminished pressure of air on the surface of the body and on the interior of the lungs.

The pressure at the sea-level constantly diminishing as you ascend, is found to be reduced to about one-half at an elevation of 16,000 feet, or the summit tunnel of the Oroya Railroad. This withdrawal of pressure often occasions the most severe symptoms of vertigo, headache, nausea, and vomiting, all more or less alarming, and attended with profound prostration. The whole are attended with increased respiration and rapid action of the heart. Dr. Ward says some are affected with fearful nausea and vomiting, comparing it to the worst form of seasickness. Others suffer from severe frontal headache, palpitation of the heart, etc. From the violence of the heart's action it really seems at times as if it would burst the walls of the chest. Occasionally severe hemorrhage occurs from all the avenues of the body.

The respirations are increased from three to five times in a minute. Dr. Ward says he has counted 43 respirations and 148 pulse in a minute at an elevation of only 9,000 feet, and that the pulse is *always* increased in frequency but not in volume. A person who, at the sea-level, has a pulse of 75 per minute, would find it increased about ten beats at an altitude of 10,000  
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feet, and would experience ten additional beats for each 1,000 feet of added altitude. The rule is that no one passes for the first time an altitude of 16,000 feet whose pulse does not mount to from 130 to 150 beats in a minute.

These increased numbers of pulsations are absolutely necessary to avert a fatal result. The attending increased respiratory action is not accompanied with increase of secretions, but an increased amount of air of inferior quality, from actual reduction of the amount of oxygen, fails to aerate or properly preserve the fluidity of the blood.

Most persons, I feel convinced, attach an undue importance to the actual diminution of the quantity of oxygen, *per se*, required by the human and animal economy generally, resulting in soroche. We know that animal life suffers no such violent symptoms as are constantly exhibited in soroche, when it is at times deprived of a large portion of its oxygen, as under battened hatches on shipboard, or when air is surcharged with smoke or steam in which people are obliged to live at or near the sea-level. It must be remembered that symptoms of soroche, above described, overtake one as he sits quietly in a comfortable car, or more frequently at night. It is one of the peculiarities of this affection that one may go to bed feeling not the slightest inconvenience, and will be awakened at midnight with the most agonizing headache, vomiting, and a gasping for breath which seems to point to impending suffocation.

A better explanation, it seems to me, and one which more completely explains all of the symptoms, may be found by ascribing more of the cause to a withdrawal of the pressure from the body. The immense reduction of one-half the accustomed pressure from the body within a few hours allows a determination of blood to the viscera and extremities, so that there is actually less blood in active circulation, and the contractions of the heart are probably made when that organ is

but partly filled with blood. This would account for the increased action of the heart, without seeking a more important or satisfactory cause in the loss of oxygen due to a rarefied condition of the air.

With this withdrawal of blood to the capillaries, it is easy to account for headache, nausea and vomiting, syncope, and other threatening symptoms derived from the brain and nervous centres. We must, hence, regard the brain as being in an anæmic condition, and is thus denied its usual stimulus on account of being enclosed in its rigid bony case, where the direct influence of the withdrawal of external pressure is not felt, as in the other, soft parts of the body. The co-ordinating power of the brain is thus lost in consequence of the distant distribution of the blood to those organs which are directly affected by the removal of external pressure, and in which an *increased* supply of blood produces no disturbance of function beside that of mechanical distention. Hence all of those painful symptoms which are referable to the anæmic condition of this part of the vital tripod.

Dr. Ward says the persons most disposed to soroche are those with a large amount of blood in the body; for example, stout, florid, muscular men usually suffer most severely. A popular illusion regarding soroche is that persons with large lungs are less liable to it than those with small, feeble lungs. The special liability of stout, large-chested men to soroche is most satisfactorily accounted for, if we admit that the removal of the external pressure is the principal factor in producing this affection. The large expanse of surface and large viscera, by becoming temporary receptacles for an increased amount of blood, act by withdrawing so much from the active circulation, causing direct anæmia of the great nerve centres. The brain is no longer a *plenum*. The heart is deprived of its normal stimulus, and in its enfeebled condition resorts to increased action to

supply urgent demands in the economy, but not for an increase of oxygenated blood particularly.

An instance is related of a party which had passed an entire year at Galera, which is the summit tunnel of the Oroya road, and has an elevation of 15,645 feet. This party of engineers, upon visiting Lima, all suffered severely for several days before becoming again accustomed to the dense air of the sea-coast. The theory of Dr. Ward and others in attributing this suffering to a change in the quality of the air, whereby an excess of oxygen was introduced into the blood, would not account for the syncope, which is a common symptom following this change. I once observed this syncope in his own case in Lima, where there was a sudden call by telegraph for his services, which obliged a descent of 16,000 feet in two hours. His theory that in this descent there is "a liability of the air-vesicles to collapse, and the retention of foul matters within them as a cause of disease" is hardly tenable, because an increase of density provides an increase of oxygen and an increased aeration of the blood within defined limits, so that the increase of vesicle surface acquired by residence in an attenuated air could exert no other than a proper result, even were the transformation of a reduction of surface to be wrought instantly. A considerable period might elapse without any reduction of this increased aerating surface, and without any injurious effect. Supposing a denser air to be breathed no increased quantity of oxygen would be absorbed, as it has been demonstrated that in breathing an increased quantity of oxygen gas no more is used in the lungs than is necessary for the production of watery vapor and carbonic-acid gas in eliminating carbonaceous matter from the blood.

But after making this sudden descent, which is often done in a hand-car at the rate of forty to sixty miles an hour, by resorting to the theory of increased pressure upon the body the

symptoms are more satisfactorily explained. The long residence at the summit provoked an increased vital contractility, which is inherent in all vital tissues, and pre-eminently in the dermis. This increased vital power, which is demanded to complement the loss of air-pressure, upon descending to the sea-level remains unaltered. The air-pressure being now added to this peripheral tone of the body causes a centripetal determination of blood, which is felt acutely by the brain and all the nerve centres. The syncope, increased respiration, and palpitation may be thus accounted for. The reduction, as it were, of the size of the body in the vascular system demands, on account of mechanical congestion of all the viscera, an increased action in the heart and lungs, whereby the blood may be rapidly aerated and rapidly passed off by the secreting and excreting surfaces. The resort to purgatives and depleting measures, under the effects of a rapid descent, is beneficial, which is a therapeutic indication of the correctness of my theory, and which I have never seen before explained.

This examination of some of the peculiarities of the west coast of South America has been extended to such length that I will omit any special notice of that part of the station north of Cape Blanco to Panama. This, with its periods of sunshine, of rains, of drought, of intense heat, tropical verdure, and of poisonous malaria, has often before been noticed in reports of the Bureau. The whole subject, however, of climatic and topographical peculiarities of the west coast of South America is yet an open field, in which but few medical laborers have worked. The most abundant opportunities exist for investigation and study, and any careful student who is fond of statistical labor will, I am satisfied, realize great advantage on this coast, and particularly be able to continually trace a direct relation between prevailing diseases and the laws of the physical world.

## U. S. S. OMAHA.

## REPORT OF SURGEON GEORGE R. BRUSH.

The complement of officers and men, cubic air-space, ventilation, lighting, and warming are given in the report of Surgeon Spear for 1873.

The average number of officers and men on board during the past year was 226. The admissions to the sick-list were 382, an average of 1.734 times for each person. Total sick-days, 4,113, an average of 18.2 days for each person. Number of deaths, 1. Percentage of mortality, .442. Number sent home sick, 10.

Water during the past four months has been mostly obtained from the shore at the following-named places:

At Callao from the supply furnished the city.

At Guayaquil, river-water from a distance above the city. This water, at the time of our visit in September, was nearly free from chlorides, and compared favorably with any obtained on this station. During the rainy season, and for some time after, it is, no doubt, too impure to be safely used.

Panama: The water-supply of this city is obtained from several springs outside of the city, and from wells and cisterns within the city limits. That used by the Pacific Mail Steamship Company, and from which the supply for our ships is drawn, is collected from a small stream on the island of Tobogo. This water is conducted from the stream through iron pipes into tanks of the same material, from which it is led by pipes and hose to the water-boat. When the tanks and their connections and the water-boat are kept in proper condition the water from this source is excellent.

Payta: This city is supplied with water brought several miles by railroad from the river Chira, and is more expensive than water condensed on board. Condensed water whenever

used soon after condensation has had the well-known "oily" taste and smell, which has been attributed to the oil that in some way gets into the boiler. I believe that this disagreeable flavor and smell is really due to volatile products produced by heat, from organisms or organic matter present in sea-water. There being no small boiler in this ship, one or more of the main boilers have to be used for condensing. The ship's tanks have a capacity of 6,116 gallons. Water for the scuttle-butt and galley is conveyed from the tanks through unlined lead pipe, which should be replaced by iron pipe. A substantial filter of sufficient capacity to supply the scuttle-butt would be beneficial, especially when water is obtained from the shore.

No complaint has been made of the usual ration. Whenever in port, fresh meat and vegetables have been issued, and liberal supplies of the latter have been taken on board by the ship's messes for use at sea. At most places visited there has been a good supply of tropical fruit, which has been freely consumed, with none but beneficial results.

Excepting the outfit for recruits, a large proportion of the men's clothing has been made on board from material furnished by the Bureau of Provisions and Clothing. Sewing-machines, the property of a number of the crew, have been much used. Considering the utility of these machines and their small cost in the United States, the selection of a suitable pattern to be placed on the supply-list would, I think, contribute to the convenience and neatness, if not to the comfort of the ship's company.





IATIC STATION.



## ASIATIC STATION.

U. S. S. TENNESSEE.

REPORT OF MEDICAL INSPECTOR THOMAS J. TURNER.

The cruising-ground of the Tennessee during the year 1876 was within the isotherms of 55° and 77° Fah., embracing Hakodate as the most northern and Hong-Kong as the extreme southern ports visited.

The complement of the Tennessee has been reduced by existing laws to 408. This reduction took place in July, 1876. The average number of the ship's company for the year has been 420.

The ventilation of the vessel remains in the same condition as in my previous report, with this exception: On the 20th May, 1876, at Yokohama, Japan, a board of officers met pursuant to order "to examine the shaft-alley of the Tennessee, suggest means for the improvement of its ventilation, and state the manner in which such improvement may be accomplished." The board reported that the shaft-alley was for all actual and practical purposes totally unventilated, and that a ventilating-shaft 18 inches diameter, made of galvanized iron, extending from the after end of the shaft-alley to 4 feet above the poop-deck, be made, and fitted with a movable cowl. This apparatus was made, and on June 5, 1876, the vessel under steam, this ventilator reduced the temperature of the shaft-alley from 90° to 75° Fah., and it remained at that temperature for an hour by observation. This shaft acts as an aspirator, the current of air being a descending one, and the men employed there at present have at least respirable air.

There has been no change in the lighting of the ship.

Warming is by the same means mentioned in the previous report, and remain as efficient as can be desired. Steam has been under one or more boilers 303 days, 15 hours in the 366 days.

In every instance where water from the shore has been examined, save at Hong-Kong, it has been unfit for drinking purposes. We have arrived at this conclusion from observations of the source of supply and experiments upon the contaminations. The quantity of distilled water has been increased by an improvement of Passed Assistant Engineer George W. Melville, U. S. N., by which, in addition to the ordinary distillers, two others have been fitted, giving an additional supply, if needed, of over 1,000 gallons in 24 hours. This is accomplished by leading the condensed water from the steam-heaters (during cold weather) through an extra condenser.

Food is of excellent quality and in usual quantity. Cooking remains the same. The Bureau of Equipment and Recruiting some time in the year published a circular containing information as to the method of preparing canned meats and other parts of the ration, in which it would be well to have the ships' cooks instructed.

Since the arrival of the Tennessee on the station, men have had their uniform-clothes made on shore by native tailors at much cheaper rates, so I am informed, than can be supplied to them from the ship's stores, and of quite as good material.

Humidity remains about the same. In 1876 the gun-deck was wet 301 times, the berth-deck 223, not including the partial wettings since July, 1876, of 83 times. Since July, 1876, however, the berth-deck has been almost entirely covered by matting, which can be readily removed. In June, 1876, I commenced a series of observations forward on the berth deck upon humidity, which are herewith tabulated. They explain themselves.

JUNE, 1876.

Date.	Hour.	Thermom-eter.		Dew-point.	Force of aqueous va-por.	Weight of aqueous vapor in cubic feet.	Weight required for saturation.	Relative humidity. Saturation = 100.	Remarks.
		Dry.	Wet.						
					<i>Inches.</i>	<i>Grains.</i>	<i>Grains.</i>		
June 12	9 a.m.								Kobe, Japan.
	3 p.m.	75	74	73.5	.814	8.87	.44	95.3	
13	9 a.m.	74.5	73	71.8	.776	8.45	.86	90.8	
	3 p.m.	75	73.5	72.42	.795	8.65	.75	95.8	
14	9 a.m.	72	70	69	.704	7.71	.79	90.7	
	3 p.m.	74	73	72.5	.787	8.60	.44	95.1	
15	9 a.m.	71.5	70	69.6	.763	7.72	.45	97.5	
	3 p.m.	73	70	68.5	.692	7.57	1.19	86.4	
16	9 a.m.	74	70	68	.681	7.44	1.60	82.3	
	3 p.m.	74	72	71	.751	8.20	.84	90.7	
17	9 a.m.	74	72	71	.751	8.20	.84	90.7	
	3 p.m.	74	72	71	.751	8.20	.84	90.7	
18	9 a.m.	74	72	71	.751	8.20	.84	90.7	
	3 p.m.	76	74	73	.801	8.71	.89	90.7	
19	9 a.m.	75	73	72	.776	8.48	.86	90.8	
	3 p.m.	74	72	71	.751	8.20	.84	90.7	
20	9 a.m.	75	74	73.5	.814	8.87	.44	95.3	
	3 p.m.	74	73	72.5	.787	8.60	.44	95.1	
21	9 a.m.	76	74	73	.801	8.71	.84	90.7	
	3 p.m.	76	73	71.5	.763	8.30	1.30	86.5	
22	9 a.m.	74	73	72.5	.787	8.60	.44	95.3	
	3 p.m.	75	74	73.5	.814	8.87	.44	95.3	
23	9 a.m.	76	74	73	.801	8.71	.89	90.7	
	3 p.m.	77	76	75.5	.868	9.42	.47	95.3	
24	9 a.m.	77	74	72.5	.787	8.57	1.32	86.7	
	3 p.m.	78	75	73.5	.814	8.82	1.37	86.5	
25	9 a.m.	78	75	73.5	.814	8.82	1.37	86.5	
	3 p.m.	75	73	72	.776	8.48	.86	90.8	
26	9 a.m.	73	71	70	.727	7.95	.81	90.8	
	3 p.m.	75	73	72	.776	8.48	.86	90.8	
27	9 a.m.	74	72	71	.751	8.20	.84	90.7	
	3 p.m.	75	74	73.5	.814	8.87	.44	95.3	
28	9 a.m.	75	73	72	.776	8.48	.86	90.8	
	3 p.m.	76	75	74.5	.840	9.14	.46	95.2	
29	9 a.m.	76	72	70	.727	7.90	1.70	82.3	
	3 p.m.	76	73	71.5	.763	8.30	1.30	86.5	
30	9 a.m.	76	74	73	.801	8.71	.89	90.7	
	3 p.m.	78	76	75	.854	9.25	.94	90.8	

JULY, 1876.

Date.	Hour.	Thermom-eter.		Dew-point.	Force of aqueous vapor.	Weight of aqueous vapor in cubic feet.	Weight required for saturation.	Relative humidity. Saturation = 100.	Remarks.
		Dry.	Wet.						
July	1	9 a.m.	78.5	78	76.81	.955	10.34	.28	97.6
		3 p.m.	78	78	78	.940	10.19	0.00	100
2	9 a.m.	80	78	76.64	.910	9.83	.98	90.9	
	3 p.m.	78	76	74.6	.854	9.25	.94	90.8	
3	9 a.m.	80	78	76.64	.910	9.83	.98	90.9	
	3 p.m.	81	79	77.6	.940	10.13	1.01	91.0	
4	9 a.m.	79	78	77.3	.925	10.01	.49	95.3	
	3 p.m.	79	77	75.6	.882	9.54	.96	90.9	
5	9 a.m.	80	78	76.6	.910	9.83	.98	90.9	
	3 p.m.	81	80	79.3	.986	10.62	.52	95.3	
6	9 a.m.	82	80	78.0	.970	10.44	1.03	91.0	Left Kobe.
	3 p.m.	80	79	78.3	.955	10.31	.50	95.4	
7	9 a.m.	83	82	81.3	1.05	11.27	.55	95.3	
	3 p.m.	83	82	81.3	1.05	11.27	.55	95.3	Yokohama.
8	9 a.m.	80	78	76.6	.910	9.83	.98	90.9	
	3 p.m.	81	79	77.6	.940	10.13	1.01	91.0	
9	9 a.m.	81	78	75.8	.896	9.65	1.49	86.6	
	3 p.m.	83	80	77.9	.955	10.25	1.57	86.8	
10	9 a.m.	83	82	81.3	1.05	11.27	.55	95.3	
	3 p.m.	83	81	79.6	1.001	10.75	1.07	90.9	
11	9 a.m.	83	81	79.6	1.001	10.75	1.07	90.9	
	3 p.m.	85	83	81.7	1.067	11.40	1.13	91.0	
12	9 a.m.	84	83	82.3	1.083	11.61	.56	95.4	
	3 p.m.	85	83	81.7	1.067	11.40	1.13	91.0	
13	9 a.m.	85	83	81.7	1.067	11.40	1.13	91.0	
	3 p.m.	85	83	81.7	1.067	11.40	1.13	91.0	
14	9 a.m.	85	83	81.7	1.067	11.40	1.13	91.0	
	3 p.m.	85	80	76.7	.925	9.89	2.64	78.9	
15	9 a.m.	83	82	81.3	1.05	11.27	.55	95.3	
	3 p.m.	85	83	81.7	1.067	11.40	1.13	91.0	
16	9 a.m.	86	84	82.7	1.101	11.75	1.16	91.0	
	3 p.m.	85	83	81.7	1.067	11.40	1.13	91.0	
17	9 a.m.	86	84	82.7	1.101	11.40	1.13	91.0	
	3 p.m.	86	84	82.7	1.101	11.40	1.13	91.0	
18	9 a.m.	87	85	83.7	1.136	12.10	1.19	91.0	
	3 p.m.	86	85	84.3	1.153	12.31	.60	95.4	
19	9 a.m.	86	84	82.7	1.101	11.40	1.13	91.0	
	3 p.m.	86	84	82.7	1.101	11.40	1.13	91.0	
20	9 a.m.	87	85	83.7	1.136	12.10	1.19	91.0	
	3 p.m.	86	85	84.3	1.153	12.31	.60	95.4	
21	9 a.m.	86	84	82.7	1.101	11.40	1.13	91.0	
	3 p.m.	86	84	82.7	1.101	11.40	1.13	91.0	
22	9 a.m.	84	82	80.6	1.034	11.07	1.10	91.0	
	3 p.m.	85	83	81.7	1.067	11.40	1.13	91.0	
23	9 a.m.	86	84	82.7	1.101	11.40	1.13	91.0	
	3 p.m.	86	84	82.7	1.101	11.40	1.13	91.0	
24	9 a.m.	86	85	84.3	1.153	12.31	.60	95.4	
	3 p.m.	86	84	82.7	1.101	11.40	1.13	91.0	
25	9 a.m.	86	84	82.7	1.101	11.40	1.13	91.0	
	3 p.m.	86	84	82.7	1.101	11.40	1.13	91.0	
26	9 a.m.	85	82	80	1.017	10.87	1.66	86.8	
	3 p.m.	86	84	82.7	1.101	11.40	1.13	91.0	
27	9 a.m.	85	84	83.3	1.118	11.95	.58	95.4	
	3 p.m.	85	84	83.3	1.118	11.95	.58	95.4	
28	9 a.m.	85	84	83.3	1.118	11.95	.58	95.4	
	3 p.m.	85	84	83.3	1.118	11.95	.58	95.4	
29	9 a.m.	85	84	83.3	1.118	11.95	.58	95.4	Left Yokohama.
	3 p.m.	85	83.5	82.5	1.092	11.67	.85	93.2	
30	9 a.m.	84	82	80.6	1.034	11.07	1.10	91.0	
	3 p.m.	83	81	79.6	1.001	10.75	1.07	90.9	
31	9 a.m.	85	81.7	79.6	1.019	10.91	1.46	93.2	
	3 p.m.	84	81	79.0	.986	10.55	1.62	86.7	

AUGUST 1876.

Date.	Hour.	Thermom-eter.		Dew-point.	Force of aqueous va-por.	Weight of aqueous vapor in cubic feet.	Weight required for saturation.	Relative humidity. Saturation = 100.	Remarks.
		Dry.	Wet.						
Aug. 1	9 a.m. ...	81	79	77.6	<i>Inches.</i> .940	<i>Grains.</i> 10.13	<i>Grains.</i> 1.01	91.0	Hakodate. Rain: cloudy.
	3 p.m. ...	78	75	72.9	.814	8.82	1.37	86.5	Rain; cloudy.
2	9 a.m. ...	76	74	72.5	.801	8.71	.89	90.7	Do.
	3 p.m. ...	76	74	72.5	.801	8.71	.89	90.7	Do.
3	9 a.m. ...	75	73	71.5	.776	8.45	.86	90.8	Cloudy.
	3 p.m. ...	79.5	78	76.4	.967	10.40	.66	95.0	Do.
4	9 a.m. ...	80	79	78.3	.955	10.31	.50	95.4	Cloudy; rain.
	3 p.m. ...	82	80	78.6	.970	10.44	1.09	91.0	Cloudy.
5	9 a.m. ...	80	78	76.6	.910	9.83	.98	90.9	Do.
	3 p.m. ...	80	78	76.6	.910	9.83	.98	90.9	Do.
6	9 a.m. ...	80	79	78.3	.955	10.31	.50	95.4	Fog.
	3 p.m. ...	82	80	78.6	.970	10.44	1.09	91.0	Cirro-stratus.
7	9 a.m. ...	84	82	80.6	1.034	11.07	1.10	91.0	Rain.
	3 p.m. ...	84	82	80.6	1.034	11.07	1.10	91.0	Do.
8	9 a.m. ...	81	79	77.6	.940	10.13	1.01	91.0	Cloudy.
	3 p.m. ...	79	76	73.9	.840	9.10	1.40	86.7	Fog; rain.
9	9 a.m. ...	79	77	75.6	.882	9.54	.96	90.9	Cloudy.
	3 p.m. ...	78	76	74.6	.854	9.25	.94	90.8	Do.
10	9 a.m. ...	79	78	77.3	.925	10.01	.49	95.3	Rain.
	3 p.m. ...	80	78	76.6	.910	9.83	.98	90.9	Do.
11	9 a.m. ...	80	78	76.6	.910	9.83	.98	90.9	Do.
	3 p.m. ...	80	78	76.6	.910	9.83	.98	90.9	Do.
12	9 a.m. ...	81	79	77.6	.940	10.13	1.01	91.0	Do.
	3 p.m. ...	82	80	78.6	.970	10.44	1.09	91.0	Do.
13	9 a.m. ...	82	79	76.9	.925	9.95	1.52	88.8	Do.
	3 p.m. ...	83	80	77.9	.955	10.25	1.57	86.8	Do.
14	9 a.m. ...	83	81	79.6	1.001	10.75	1.07	90.9	Clear.
	3 p.m. ...	83	80	77.9	.955	10.25	1.57	86.8	Slight rain.
15	9 a.m. ...	84	82	80.6	1.034	11.07	1.10	91.0	Clear; cloudy.
	3 p.m. ...	84	81	79.0	.986	10.55	1.62	86.7	Clear.
16	9 a.m. ...	84	82	80.6	1.034	11.07	1.10	91.0	Clear; rain.
	3 p.m. ...	84	82	80.6	1.034	11.07	1.10	91.0	Clear.
17	9 a.m. ...	85	83	81.7	1.067	11.40	1.13	91.0	Cloudy.
	3 p.m. ...	85	82	80.0	1.017	10.87	1.66	86.8	Do.
18	9 a.m. ...	79	75	72.2	.801	8.66	1.84	82.5	Cloudy; rain.
	3 p.m. ...								

Observations as above were discontinued this date in consequence of an order to that effect.

*Bilge-water.*—In July, 1876, I made a few observations upon bilge-water, and their results are here tabulated:

1. Sp. gr. sea-water, 1.018; temperature, 83° Fah.

Sp. gr. bilge-water, 1.022; temperature, 82° Fah.

Color of diluted ink, strongly smelling of H<sub>2</sub>S; blackens acetate of lead-paper, strongly alkaline, covered with mold. Bilges had not been cleaned for several days.

2. Sp. gr. sea-water, 1.022; temperature, 76° Fah.

Sp. gr. bilge-water, 1.024; temperature, 82° Fah.

Color very dark, inky, strongly smelling of  $H_2S$ ; blackens acetate-of-lead paper, transparency impaired, strongly alkaline. Bilges cleaned day before.

3. Sp. gr. sea-water, 1.024, at  $71^\circ$  Fah.

Sp. gr. bilge-water, 1.024, at  $70^\circ$  Fah.

Dark, smoky, strongly smelling of  $H_2S$ ; blackens acetate-of-lead paper, alkaline reaction. Bilges cleaned day before.

It seems, therefore, that there is a tendency to the concentration of sea-water. Under the microscope no living organisms were found with one-tenth objective. Parkes states that without producing any marked disease,  $H_2S$ , which is abundant in bilge-water, may act injuriously on the health. We have the authority of Parent du Chatelet that  $H_2S$  in the air aggravates venereal affections.

*Fire-rooms.*—I have only two observations noted of extreme ranges of temperature. January 31, 1877, the temperature of the fire-room was  $185^\circ$ , and on February 1, 1877, at 9 a. m. and at 3 p. m., the thermometer marked in the fire-room  $198^\circ$  at the height of a man from the deck-plates.

*Means of saving life at sea.*—The great loss of life at sea in the more modern encounters between vessels of war has drawn attention to the means of saving life after battle. Beyond our own boats, the Tennessee has a couple of life-rafts, the invention of Commodore Daniel Ammen, U. S. N. To those who witnessed their performance on the 4th of July, 1876, at Kobe, their eminent utility for such a purpose was a matter of demonstration. I would recommend that the mattresses of the men should in future be made with cork shavings. Here, almost within sight of the Oneida disaster, it becomes strongly impressed upon me that such mattresses would have diminished the great loss of life on that occasion; as also in the *Re d'Italia* at Lissa.

*Carbon dioxide.*—I here present a few observations upon the



amount of carbonic-acid gas in the air of the berth-deck, determined experimentally by Pettenkofer's method, during the month of March, 1877. These figures show better than the usual surmises as to the necessity for ventilation.

1877.		Barometer (anoid).	Attached thermometer.	Locality.	CO <sub>2</sub> per cent. corrected for temperature and pressure.	Remarks.
Day.	Hour.					
March 20	2 p. m.	30.20	73	Dispensary	.0118	Hong-Kong.
March 21	4 a. m.	30.20	72	Berth-deck	.0320	Do.
March 21	2 p. m.	30.16	74	Dispensary	.0281	Do.
March 21	12 M.	30.22	74	Berth-deck	.0314	Do.
March 22	2 p. m.	30.22	74	Dispensary	.0351	Do.
March 22	Mid.	30.22	74	Berth-deck	.0374	Do.
March 23	2 p. m.	30.10	76	Dispensary	.0214	Do.
March 23	Mid.	30.12	76	Berth-deck	.0288	Do.
March 24	2 p. m.	30.20	72	Dispensary	.0914	Do.
March 24	Mid.	30.26	72	Berth-deck	.0477	Do.
March 25	2 p. m.	30.10	72	Dispensary	.0484	Do.
March 25	Mid.	30.14	70	Ward-room	.0524	Do.
March 26	2 p. m.	30.12	74	Dispensary	.0371	Do.
March 26	Mid.	30.28	72	Ward-room	.0964	Do.
March 27	2 p. m.	30.40	68	do	.1356	Do.
March 27	Mid.	30.44	68	do	.080	Do.
March 28	2 p. m.	30.40	66	do	.097	Do.
March 29	2 p. m.	30.20	66	do	.091	Do.
March 29	Mid.	30.34	67	do	.038	Do.
March 30						No observation.
March 31	Mid.	30.58	68	Ward-room	.076	Hong-Kong.
April 1	Mid.	30.44	72	do	.0603	
April 8	Mid.	30.24	78	do	.125	At sea.

#### CLIMATOLOGY OF THE PLACES VISITED, 1876.

*Nagasaki*.—Latitude,  $32^{\circ} 44'$ ; longitude,  $129^{\circ} 51'$ . On a bay of same name, having a northeast direction, sheltered from all winds. Population, native, 70,000; Chinese, 629; foreign, 214. Badly drained; water, bad. Prevalent diseases, rheumatism, diarrhoea, dysentery, beri-beri (kakke). Hottest month, August,  $28.89^{\circ} \text{C}$ .; coldest, January,  $6.10^{\circ} \text{C}$ .; average relative humidity, 81.20. Rainy month, June; dry month, October. Lowest barometer, August; highest barometer, February. Winds from north for about 290 days; 109 rainy days. These are the results of 15 years' observation.

*Kobe*.—Latitude,  $34^{\circ} 41'$ ; longitude,  $135^{\circ} 11'$ . Littoral exposure 19 HX

sure to northeast. Population, 204,000; foreign, 748, including Chinese. Hottest month, August; coldest month, February; dry month, August; wet month, January. Highest barometer, January; lowest barometer, July. Winds, winter, northwest; summer, veer with the sun. Water-supply, wells; drainage, natural. Probably the most healthy place, considering its sanitary condition, in Japan. Prevalent diseases, malarial, rheumatism, etc.

*Hakodade or Hakodate.*—Latitude,  $41^{\circ}47'$ ; longitude,  $140^{\circ}42'$ . On island of Yeso. Littoral exposure to northward and westward. Population, estimated, 26,350; foreign, 25. Geology, volcanic alluvium. Drainage, natural; water, bad. Prevalent diseases, phthisis, pneumonia, kakke, diseases of respiratory system. Hottest month, August,  $88^{\circ}$ ; coldest months, December and January,  $2^{\circ}$  to  $49^{\circ}$ . Average relative humidity, 82.2. Rainy month, August; dry month, February; average annual rainfall, 51.907 inches. Highest barometer, November; lowest barometer, August. Wind most frequent from west. Rainy days in year, 98.2. It has snowed in winter daily for six consecutive weeks.

*Yokohama.*—Latitude,  $35^{\circ}25'$ ; longitude,  $139^{\circ}29'$ . On bay of same name. Littoral exposure to northward and eastward, on a plain, backed by high hills. Population, foreign, 1,000. Alluvial over volcanic tufa and conglomerate. Hottest month, August,  $81^{\circ}$ ; coldest month, February,  $37^{\circ}$ ; mean annual temperature,  $59^{\circ}$ . Average relative humidity, 82.1%. Rainy month, September, 12.76 inches; dry month, February, 0 inches; average amount rainfall, 44.28 to 62.89 inches. Highest barometer, November; lowest barometer, December. Winds, northeast. Sanitary condition, fair. Water, bad. Prevalent diseases, malarial, rheumatism, kakke.

*Yokoska*, the site of an imperial Japanese navy-yard, is 12 miles to the southward of Yokohama. It is built on decom-

posing granite and volcanic *débris*. Is not drained. Water bad. Malarial diseases are prevalent, from the recent upturning of the soil for the workshops. Enthetic diseases also are numerous.

*Ninghai*.—Latitude,  $38^{\circ} 22'$ ; longitude,  $106^{\circ} 30'$ . Is 2 miles from the sea, on a plain, at the foot of a mountain range, and on the west side of the great wall. I have no notes upon its sanitary condition.

*Newchwang*.—Latitude,  $40^{\circ} 20'$ ; longitude,  $123^{\circ} 50'$ . Malarial diseases are unknown. Very dry; has no rainy season. Rain falls in great quantities and with violence, but it is soon over, and the air becomes cool. No drainage. Pulmonary and cardiac diseases prevalent. Hottest month, July,  $83^{\circ}$ ; coldest month, January,  $4^{\circ}$  Fah.

*Taku*, at the mouth of the Peiho River, on a sterile, flat alluvium.

*Chefoo*.—Latitude,  $37^{\circ} 35'$ ; longitude,  $121^{\circ} 22'$ ; on a sandy peninsula. North winds in winter are very severe. Heat never intense. No drainage. Bad water. Climate called bracing. Hottest month, August,  $85^{\circ}$ ; coldest month, January,  $23^{\circ}$ . Very wet in July; very dry in October. Malarial diseases unknown.

*Shanghai*.—Low alluvial plain on left bank of Woosung River, 60 miles from sea. Water, in 1874, considered "the filthiest in the world." Foreign concessions drained; no drainage in the native city. In the concessions, population, 5,589, of which 3,996 are English, and the rest American, French, German, etc. January, fine; February, fogs; March, damp; April, rain; May, little rain, in heavy showers; June, wet month; July, hot, scorching; August, hot, scorching; September, southwest monsoon; December driest month; September sickly month. Mortality, 30.1 per mille. Prevalent diseases,

variola, typhus fever, intermittent and remittent fevers, heat-apoplexy.

*Hong-Kong*.—Island running north-northwest and southeast;  $7\frac{1}{2}$  miles long. Barren, lofty peaks, 1,000 to 2,000 feet high, sterile granite rock, decomposing. Town of Victoria faces northeast. Population, 155,387, of which 1,644 are Europeans. Hot months, June and July,  $82^{\circ}.4$ ; coldest months, January and February,  $63^{\circ}.9$ . Highest barometer, November; lowest barometer, July. Average relative humidity, 79+. Average rainfall, 74.46 to 90 inches. Number of rainy days, 107 to 111. Winds, January, February, March, November, and December, east and northeast; April, east, south, and southeast; May, June, July, and August, southeast and southwest; September and October, east and northeast. Range of temperature,  $53^{\circ}$ . Wet months, June and July; dry months, January and February. Prevalent diseases, fevers, chest affections. Barely well drained. Gradually becoming a healthy place. Town is built on decomposing granite and laterite.

In closing this imperfect sketch of the essential conditions of life as surrounding the Tennessee, I add a tabular statement of the movement of disease during the quarters of the year 1876, which explains itself:

*Tabular statement of admissions for 1876.*

Diseases.	First quarter.	Second quarter.	Third quarter.	Fourth quarter.	Total.
Miasmatic .....	10	4	6	13	33
Enthetic .....	25	26	17	14	82
Dietic .....	5	4	8	17	34
Diathetic .....	26	29	36	28	119
Developmental .....	0	0	0	0	0
Tubercular .....	0	0	0	0	0
Parasitic .....	0	1	0	0	1
Nervous system .....	12	8	7	7	34
Eye .....	3	0	1	2	6
Ear .....	0	0	0	0	0
Teeth .....	1	0	0	0	1
Circulatory system .....	7	3	2	4	16
Respiratory system .....	18	12	12	11	53
Digestive system .....	49	32	48	51	180
Urinary and genital system .....	8	9	11	6	34
Locomotive system .....	2	0	3	0	5
Integumentary system .....	21	13	42	20	96

*Tabular statement of admissions for 1876—Continued.*

Diseases.	First quarter.	Second quarter.	Third quarter.	Fourth quarter.	Total
Non-malignant tumors, &c .....	0	0	0	0	0
Wounds, injuries, &c .....	36	26	36	27	125
Total .....	223	167	229	200	819
Total sick-days .....	3,593	2,204	2,445	1,985	10,227
Average crew .....	504	463	328	385	420
Deaths .....	1	0	0	0	1
Invalided to United States .....	0	16	7	3	26

Daily average number of sick, 27 $\frac{1}{3}$ .

Loss of service to admissions, 12 $\frac{1}{3}$  days.

Loss of service to average crew, 24 $\frac{1}{3}$  days.

Each person of the average crew was admitted 1.95 times.

Invalided to United States (26), 6.01+ per cent. of average crew.

Some general considerations present themselves as affecting the lives and health of sailors on this squadron, and I have hinted at some points which I hope may attract the attention and careful observation of abler men.

On this station we have the birth-place of cholera. Inoculation here preserves variola, and beri-beri presents itself as the puzzle of pathologists. Race, manners, customs, all modify in greater or lesser degree the so-called vital processes. There is much to study in the vast extent of this station. I have skimmed over the surface. My study has been limited to a floating town whose climate varies as political views change. Bearing this in mind the prime object of all sanitary work on shipboard has been to point out the preventable causes of disease—disease which (to use the words of an able writer) “is under all circumstances the lowering of life, and even in its most trivial form is the shadow of death.”

#### ADDENDA.

Herewith are transmitted, 1. A tabular statement of the movement of disease in the Asiatic squadron for the year 1875; and, 2. A graphic representation of the same movement. I beg leave to suggest for your consideration the following facts:

That the force represented is recruited; that only choice lives are therefore selected, and that the deaths, invaliding, and total sick-days for one year of this force are in excess of the ordinary movements of disease. Further observation, however, may reveal the existence of some association with the disease-zone in the limits of this station. I may remark that the disease movement represents the daily loss to the efficiency of this squadron in time of peace of one vessel of the Ashuelot class. I have briefly attempted to call attention to the more salient points revealed by this statement, knowing that others will present themselves to your observation.

The graphic scale exhibits the amount of sickness per mille of the mean strength classified according to the nomenclature, and is drawn, of course, on a scale of thousandths.

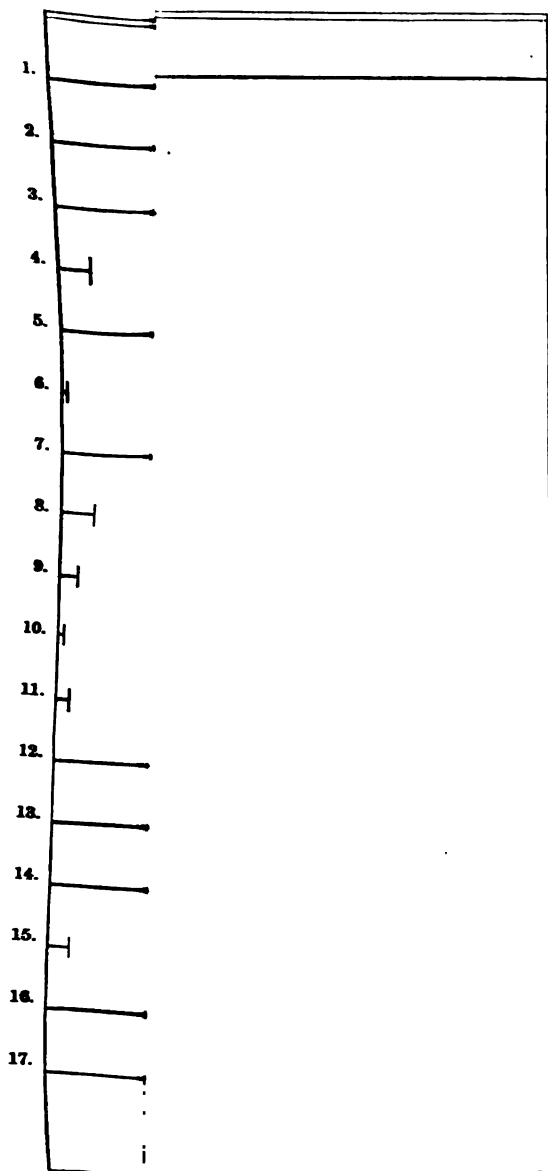
*Tabular statement of the movement of disease in the United States Asiatic squadron for the year 1875.*

Diseases.	First quarter.	Second quarter.	Third quarter.	Fourth quarter.	Totals.
Miasmatic diseases .....	50	50	60	45	205
Enthetic diseases .....	42	21	35	45	143
Dietic diseases .....	3	1	3	11	18
Dianthetic diseases .....	28	27	69	53	177
Parasitic diseases .....	1	1	1	1	4
Diseases of the nervous system .....	15	13	29	18	75
eye .....	4	5	8	5	22
ear .....	2	1	6	1	9
teeth .....	1	1	1	1	4
circulatory system .....	1	1	5	3	8
respiratory system .....	65	13	27	48	153
digestive system .....	47	127	148	103	425
urinary and genital system .....	17	9	24	22	72
locomotive system .....	2	3	6	1	11
integumentary system .....	38	39	103	57	237
Wounds, injuries, and accidents .....	46	25	100	99	270
<b>Total admissions.</b> .....	<b>359</b>	<b>335</b>	<b>624</b>	<b>510</b>	<b>1,828</b>
Total sick-days .....	3,577	2,939	4,892	5,188	16,596
Average force .....	1,216	838	1,341	1,312	1,167
Average admissions per 1,000 mean strength .....	295.23+	399.76+	466.07+	388.71+	1,566.40+
Total deaths .....	7	7	7	7	28
Total invaliding to United States .....	26	26	26	26	104
Deaths per thousand of admissions .....	3.82+	3.82+	3.82+	3.82+	3.82+
Invaliding to the United States per thousand of admissions .....	14.22+	14.22+	14.22+	14.22+	14.22+
Deaths per thousand of mean strength .....	5.99+	5.99+	5.99+	5.99+	5.99+
Invaliding per thousand of mean strength .....	22.27+	22.27+	22.27+	22.27+	22.27+

Daily average number of sick, 45.44.

Each person admitted 1.56+ times.

Average duration of illness, 9.07+ days.



2. Miasmatic d	1.71 +
3. Enthetic dis	6.85 +
4. Dietic disease	131.10 +
5. Diathetic dis	364.18 +
6. Parasitic dis length	61.67 +
7. Diseases of	9.42 +
8. Diseases of th	203.08 +
9. Diseases of	231.36 +





## U. S. S. MONOCACY.

## REPORT OF ASSISTANT SURGEON PHILLIPS A. LOVERING.

*Hygiene.*—As I did not enter upon the performance of my duties on board this vessel until the 17th October, 1876, the period over which my observations have extended is necessarily short, and I shall not enter into as detailed account of the vessel and its complement as I hope to do a year hence.

The number of officers attached to the vessel is 14, viz, 1 in the cabin, 10 in the wardroom, and 3 in the steerage. The crew is composed of 110 sailors and 4 marines, a total of 114. The whole number aboard is 128.

The total number of men admitted to sick-list during the year was 67. The total number of sick-days was 1,112. The average daily number upon the sick-list has been  $3\frac{14}{68}$ . There have been two deaths during the year. One of them was a man who was found dead ashore after a debauch. The other death was caused by the exhaustion after long-continued diarrhoea.

The principal affections prevalent on board ship during the past year appear to have been venereal diseases of all kinds, acute diarrhoea and catarrhus, the two last due in great measure to climatic influences.

The cabin and ward-room have each two hatches, besides the usual number of air-ports, and are well ventilated. The berth-deck has three hatches besides the air-ports, and the ventilation has been excellent during the mild and pleasant weather which we have had for the past three months. I have had no opportunity to observe the ventilation of the ship during either extreme heat or cold, or while under way; for during the short period that I have been attached to the ship the only cruising we have done has been from Shanghai to Chinkiang, a distance of less than 200 miles.

The vessel is unusually well lighted by the hatches and air-ports, and is well heated throughout by steam supplied from one of the auxiliary boilers.

All the water used on shipboard is distilled, of excellent quality, free from impurities, and well aerated. The tanks contain 1,800 gallons, which is sufficient for a week's supply, allowing each individual on board two gallons a day.

The crew have fresh provisions almost continuously, at least six days out of seven; fresh meat, usually beef, and vegetables of various kinds. Besides the regular ration, the different berth-deck messes purchase large amounts of fruit, poultry, and game, which are of excellent quality and very cheap.

Most of the clothing worn by the men is purchased from native tailors, and very little is drawn from the paymaster's supplies. The clothing thus obtained is of excellent quality, well made, durable, and much superior to the average clothing I have seen at home. Being made for each man the fit is much better, and undoubtedly more comfortable than they would be if drawn in the usual manner.

Judging from the limited experience I have had on this vessel, and the short space over which my observations extend, I think that the hygienic condition of the vessel is excellent, and that the comfort of the crew could scarcely be improved.

*Climatology.*—The maximum temperature at Shanghai during the month of October was 84° Fah.; the minimum 45° Fah., a range of nearly 40°. The rainfall was very light, and the weather continuously pleasant. During the month of November at the same place the maximum temperature was 73° Fah.; the minimum 30° Fah., a range of over 40° Fah. The weather continued fine, and the rainfall slight.

During the month of December, spent partly at Shanghai and partly at Chinkiang, the maximum temperature was 66° Fah., and the minimum 28° Fah. During the early part of the month there was considerable bad weather and a moderately heavy rainfall for this season of the year, which, as a rule, is very dry.

*Medical topography.*—The only ports at which the vessel has

been stationed since I joined her have been Shanghai and Chinkiang.

Shanghai is situated on the banks of the Woosung River, near the mouth of the Yangtse-kiang. The country is alluvial and perfectly level, intersected with numerous canals, some of them running through the center of the city, and even in the driest season water can be found within a few feet of the surface. The foreign population resident at the port is about 1,700, as I was informed by Mr. Bradford, vice-consul-general. The native population is very large, and cannot be estimated with accuracy. The foreign concessions are kept clean, while in the native city there is a total disregard of all hygienic laws, and the place is filthy and disgusting in the extreme, a hot-bed for all diseases.

I have obtained from the medical reports, published by the imperial customs, and edited by Dr. R. A. Jamieson, of Shanghai, the following facts relating to the health of the port. The total mortality among foreigners for the six months ending 31st March, 1876, was 45; of this number 24 belonged to the resident and 21 to the non-resident foreigners.

Of the 24 deaths among the residents, 8 were children under three years of age. The remaining 16 are classified as follows:

Cancer.....	1
Phthisis .....	1
Nephritis .....	1
Heart disease .....	1
Hæmatemesis .....	1
Alcoholism .....	1
Acute and chronic diarrhœa.....	2
Cholera .....	3
Continued (enteric) fever .....	2
Uncertified.....	3
<b>Total .....</b>	<b>16</b>

The 21 deaths among the non-resident foreigners are as follows:

Cancer .....	1
Heart disease .....	1
Congestion of brain .....	1
Drowned .....	4
Acute and chronic diarrhœa .....	3
Cholera .....	5
Uncertified .....	6
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Total .....	21

It will be readily seen that out of the 37 deaths of adults, both resident and non-resident, 13, or over one-third, were due to diarrhœa and cholera.

Besides intestinal affections, malarial fevers, both intermittent and remittent, are very prevalent in Shanghai, not, however, of a fatal type. Continued or typhoid fever is also common. The occurrence of these affections is undoubtedly due to the low and wet location of the city and the large amount of decaying matter which is present around it, and also, to some extent, to the poor character of the drinking-water, which is obtained from the Woosung River, the main sewer of a large population. Much of the water drunk is filtered and purified by alum, but the best of it is of doubtful quality.

Chinkiang, the port at which we are now stopping, is situated on the banks of the Yangtse-kiang, about 150 miles above its mouth. The surrounding country is hilly and broken, presenting a great contrast to the alluvial delta which lies along the sea-coast, and for 125 miles inland in some places. The native population is large, numbering nearly 150,000, while there are less than 50 foreigners resident in the port.

Dr. Platt, the medical officer of the place, informs me that the health of the inhabitants is good, and that there are no en-

demio diseases of importance. Diarrhoeal affections prevail to some extent during the warmer months, but are not of a severe type. In the colder months small-pox is quite common among the native population, but this is the case in almost every large city in the empire.

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U. S. S. KEARSARGE.

REPORT OF SURGEON EDMUND C. VER MEULEN.

This vessel has now been in commission a few days longer than three years. She has been employed, for the most part, on the Asiatic Station, has visited principally the northern ports, and has passed most of the time at Hong-Kong, Shanghai, Nagasaki, and Yokohama. During the year she has visited, successively, the following localities, viz: Shanghai, Nagasaki, Hong-Kong, Swatow, Manila, Vladivostok, and Hakodadi. These places have been already so well described in the reports of other medical officers of the service that I find nothing new to add.

The complement of her officers and men has varied considerably during the year. For the first quarter it was 188; for the second quarter, 196; for the third quarter, 165; and for the fourth quarter, 174.

The cubic air-space, ventilation, and warming conditions have continued and remain about the same as was represented in the report of my predecessor, Surgeon Samuel F. Shaw (whom I relieved from duty August 26 last), and which was published in the Sanitary and Medical Reports for 1873-'74. The cubic air-space per man on the berth-deck has been slightly increased by the decrease in the number of the crew. In other respects the hygienic situation is about the same.

During the first quarter the sick-list was unusually large, av-

eraging more than five days per man. The greater part of this period was passed at Shanghai, and at a season of the year when the weather was particularly unfavorable to health, and the ship's company suffered accordingly. The diseases that resulted were principally of a miasmatic, an enthetic, a pulmonic, and an enteric character. Phagedæna putris made its appearance, and all wounds were more or less unfavorably affected by it. In the second quarter erysipelas also became epidemic, and four cases came under treatment. The principal causes of these malign influences were the crowding of the crew together, remaining between decks, and willfully and persistently excluding fresh air because of the wet and cold.

From April 20 until July 10 this vessel lay in the harbor of Hong-Kong. These months are more or less unfavorable to health in this locality, and when enteric and miasmatic diseases are most likely to prevail, particularly diarrhœa and intermittent fever; 26 cases of the former and 10 of the latter obtained. From about the 1st of April until the latter part of September, and even later, occasionally, the climate of Hong-Kong is debilitating and unhealthy, and unfavorable to the physical welfare of its residents and visitors. From September until March it improves in salubrity. The finest months are November, December, January, and February, when the weather is generally fair and the temperature agreeable.

The fourth quarter was unusually healthy, owing to the fact that the temperature was lower, the air drier, and that we frequented localities favorable to our physical comfort and well-being.

The sanitary institutions of Hong-Kong and Yokohama have been so fully and extensively described in similar communications to the Bureau that I shall not attempt to add anything thereto.

The water consumed on board has been of the same descrip-

tion and quality and obtained from the same sources as was the case during the first year of the cruise.

The appliances for heating the various parts of the vessel are the same as those which have been previously described.

The average number of days each man has been on the sick-list is as follows: During the first quarter of the year,  $5\frac{1}{2}$ ; the second quarter,  $3\frac{1}{2}$ ; the third quarter, 4; and the fourth quarter, 2. Consequently, the average for the year has been  $14\frac{1}{2}$ .

There was only one death, which was from small-pox, and occurred at Nagasaki in January.

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U. S. S. YANTIC.

REPORT OF PASSED ASSISTANT SURGEON C. U. GRAVATT.

The complement of this ship was reduced on July 1, 1875, to 106, and again in August, 1876, to 96, giving an average for the year of 102, exclusive of 12 officers and a marine guard, the complement of which is 13. The latter must be added to the foregoing allowance, making a total of 115. The average number actually on board, not including officers, has been 122.5, or 7.5 above the complement.

Total number of sick-days, 2,370, distributed as follows: First quarter, 874; second, 501; third, 608; fourth, 387. Daily average of patients, 6.5; total number of admissions, 215; percentage of sickness to those actually on board, 174.9; average length of time each patient was under treatment,  $11\frac{5}{8}$ ; mortality, 1. From the total number of sick-days 248 should be deducted, and 15 from the number of admissions, as they represent the admissions and number of sick-days of men sent temporarily to the ship to await transportation, after having been condemned by medical survey, and of those sent from the Naval Hospital at Yokohama on account of obstreperous conduct at that institution, and therefore cannot properly be considered in calculating the sick-rate of the ship, which is inor-

dinately great of itself. This being done, the true condition of things would stand: Sick-days, 2,122; daily average of patients, 5.81; total number of admissions, 200; actual number on board, 121.3; percentage of sickness to those attached and belonging to the ship, 165. Of the whole number of extra sick-days, 210 occurred in the third quarter, which, deducted, would leave 398. The remaining 38 were distributed through the second and fourth, while the 874 of the first quarter represent the sick-rate of the ship's company proper for that period, and is over 200 per cent. greater than the average for the other three. During most of that quarter the Yantic was at Shanghai, China, where the weather was cold, and generally rainy or snowy. This will be alluded to again under ventilation. Reference is invited to the subjoined synopsis of sick-reports for the year in connection with the large ratio of diseases of the respiratory organs during the same quarter, and the fact that there was not a single such admission during the second, which was spent in Hong-Kong and Canton, the ship going to Japan in the latter part of June, after which month our men-of-war should not remain south of the thirty-second parallel of latitude unless special circumstances demand their presence.

*Synopsis of sick-reports for 1876.*

Diseases.	First quarter.	Second quarter.	Third quarter.	Fourth quarter.	Total.
Miasmatic diseases .....	2	1	1	—	4
Enthetic diseases .....	9	12	9	5	35
Dietetic diseases .....	1	1	2	3	7
Diathetic diseases .....	4	4	8	1	17
Diseases of the nervous system ..	2	2	—	—	4
eye .....	1	1	—	1	3
ear .....	1	—	1	—	2
circulatory system .....	1	2	—	1	4
respiratory system .....	24	—	3	5	32
digestive system .....	6	16	11	8	41
urinary organs .....	7	2	2	5	16
integumentary system .....	7	6	4	4	21
locomotive system .....	—	—	3	—	3
Non-malignant tumors, wounds, injuries, &c .....	6	8	9	3	26
	71	55	53	36	215



The complement of officers has been stated as 12. Among them there were eight admissions to the sick-list during the year, as shown by the table below. Percentage of sickness to the complement 66, opposed to 165 for the ship's company.

Date of admission.	Disease.	Date of admission.	Disease.
March 29 .....	Calculus (renal) .....	April 20 .....	Mental unsoundness.
April 1 .....	Colica .....	September 18 .....	Bronchitis ac.
March 12 .....	Bronchitis ac .....	November 5 .....	Tonsillitis.
March 20 .....	Colica .....	December 8 .....	Diarrhoea ac.

The admissions during the first quarter amounted to 3, or 25 per cent. of complement. Of these, one case was bronchitis; the other two resulted from causes not incidental to the service. The admissions among the men for the same time numbered 67, or 54.4 per cent. of complement; and 22 of these cases, or nearly 33 per cent., were diseases of the respiratory organs.

Cubic air-space of cabin, 1,750 feet. Wardroom, 1,365 feet, used daily by 13 persons, = 105 feet each. Wardroom state-rooms, 149 feet. Steerage, 2,003 feet; average number quartered there, 3, = 667.3 feet each; besides whom two servants and an indefinite number of men employ it daily in performing the ordinary duties of the ship. Forecastle, under which are situated the galley-bucket lockers, officers' water-closets, etc., 4,035 feet. Hammock-hooks are here provided for 36 men, affording 104 feet for each man. Berth-deck, 5,345 feet, and 92 billets, allowing 50.2 feet, deducting in each case 9 feet for the space occupied by a man and his bedding. The average number sleeping under the forecastle has been about 25, each man having 152.4 cubic feet of air-space. For the remaining 98 the berth-deck could only afford 46.5 feet each. At sea, one watch, averaging 21 men including those employed in the fire-room (and this I am told is a liberal allowance), was on deck, one-third of these being taken from the forecastle; the breathing-

space to those remaining was then respectively 216.3 and 54.6 feet. Considered in connection with the insufficient means provided for the ventilation of this part of the ship, the given figures cannot be made to show even a reasonable allowance.

In hot weather the above estimate for the berth-deck is indefinitely multiplied, because then the men not only prefer but are encouraged in sleeping on the spar-deck under the awnings, leaving very few who continue to use the deck below; and having been under way but 21 days up to December 4, when we left Yokohama for the United States, the air-ports were kept open and windsails adjusted, thereby making it comparatively comfortable for those few. During cold and inclement weather, on the contrary, the men are disposed to crowd this deck, ignorant or unwilling to believe that the purer, though colder, air above is preferable to that below.

I endeavored to have as many as possible coerced into sleeping on the upper deck, but was informed that, even if convinced it were better for their health, such an order would not be given, the reason assigned being that the berth-deck is the space allotted for this purpose. If constructors saw fit to reduce the space in question to the contracted limits of an ordinary bale-box, the same line of reasoning would obtain equally well, the idea seeming to be that any faults existing in this regard must be endured, instead of being corrected according to circumstances or requirements.

During the year 21 men and 1 officer were transferred to hospital for the following diseases (the \* denoting those belonging to the ship's company):

*Pneumonia ch.....	1
*Bronchitis ch .....	2
Phthisis pneumon. ch.....	1
*Dementia .....	1
*Dementia and adynamia .....	2
Asthma .....	1

Adynamia.....	3
Rheumatism ch .....	2
*Morb. valv. cord .....	1
Syphilis consec.....	2
*Hemiplegia .....	1
Necrosis .....	1
Psoriasis .....	1
*Carcinoma rect .....	1
Hernia ing.....	1
*Orchitis .....	1
<hr/>	
Total .....	22

There were 29 admissions for venereal diseases; 15 of these were for syphilis, but no Hunterian chancre was seen. The chancroids healed quickly and thoroughly when promptly presented, and the constitutional symptoms were generally amenable to treatment. Gonorrhœa was found to be much more obstinate and intractable, but if put under treatment within 24 hours from its first appearance, it usually yielded well to an injection of sol. argent. nitras, gr. i to ʒi. If attention was longer delayed the inflammation displayed exceeding proneness to extend itself to the prostate and bladder, and to the formation of tough contractile strictures, no matter what method of cure was adopted. Strictures not permitting the passage of No. 3 bougie, English scale, hard and unyielding, I have usually divided, using Maisonneuve's modification of Bumstead's urethrotome with most satisfactory results, accomplishing in a few minutes, and more effectually, what would require months', perhaps years', persistent use of bougies with the unsatisfactory probability of subsequent contraction. Out of 25 cases (not confined to the ship) so operated upon, no untoward symptom arose save in one, that of a laboring Chinaman at the Missionary Hospital in Canton. The stricture was of many years' standing, exceedingly tortuous and fibrinous, and not admitting

a No. 1 bougie. The blade corresponding to No. 12 was passed, stricture divided, and elastic bougie of that size easily introduced. On the day following the patient felt well and left the hospital against advice and resumed work. Three days subsequently his death was reported, the symptoms described pointing to urethral fever.

A much larger number of venereal diseases were contracted at Nagasaki, in proportion to the length of stoppage, than any other port—generally chancroids. On several occasions the stay of the ship was limited to from 24 to 48 hours, and no liberty given; yet each time after the ordinary incubatory period a greater or less number of cases were presented. Inquiry developed a rather singular source of origin. It is customary at that place for the barges bringing coal to also bring a number of women to pass the coal into the bunkers, who obey invitations extended by the men to visit the hold and dark corners of the ship, and are apt to leave with their hosts this token of remembrance.

The system of compulsory examination of known prostitutes weekly, by medical officers appointed for the purpose at each port, established in Japan in 1867, is still enforced at Yokohama and Nagasaki. Of the remaining ports I cannot speak definitely. Establishment of the same system is being tried at Shanghai and Hong-Kong, but with less favorable results than at Yokohama, the want of isolation of licensed prostitutes being the main obstacle. The municipal authorities, however, continue to pay commendable attention to the subject. The station-order of March, 1869, requiring the examination of men before going ashore on liberty has fallen into disuse, a natural result of a subsequent amendment to the order exempting petty officers, married men, and all over thirty-five years of age. Soon after my joining the Yantic, in June, 1875, at Swatow, China, monthly examinations of the entire crew

were instituted for the detection of any unreported venereal disease. The apothecary conducted these investigations, reporting everything of a suspicious nature. So far from lowering the moral standard of the crew, as had been predicted, and causing the discontinuance of the order alluded to, the men soon learned to appreciate the object and importance of the measure, and after a time it was rare to discover any concealed disease. In its successful prosecution every assistance was received from the commanding and other officers. The names of all infected men were placed on what was known as the surgeon's restrictive list, a copy of which was kept by the executive with his own, and no man, while his name was borne thereon, was allowed to leave the vessel. Those failing to present themselves for examination met with suitable punishment. Thus, though all of the unfortunates were not excused from duty, they were kept under constant treatment. Excesses that would have been indulged in and have retarded cure had they been granted liberty were prevented.

The cabin, situated abaft the ward-room, is ventilated by means of 6 air-ports, 4 gun-ports (one on either side and two aft), a companion-way opening forward on the poop, and a circular hatch, 30 inches in diameter, through which a windsail is fitted.

The ward-room, 24 feet in length, and of an average breadth of 11 feet, is on the spar-deck; has two skylights of 6 square feet each, two doors and five windows opening on deck, a gun-port in the second room, on either side, and 8 ordinary circular air-ports. The last are in the state-rooms, and, being placed high, can almost always be kept open. Ventilation and lighting through them have, however, been considerably obstructed by spare spars stowed outside.

So far as these two apartments are concerned, I have no suggestion to offer for improvement, except one that is intended

for all others as well, viz, that the present old-fashioned hinge-pattern circular air-ports be replaced by square ones of at least 12 inches, or, if necessary to save the cutting of important timbers, they might have greater length than breadth, but to encase the dead-lights now in use, so that when it becomes necessary to close them light may still be admitted. Within should be a pane of glass fitted to slide, in order that protection from rain or ingress of water from the washing of the ship's sides, etc., may be gained without lowering the port-shutters and excluding so much light. In addition, there should be a sliding Venetian blind to shut out light when desirable, but admit air.

Such suggestions can now be made without incurring the risk of being declared fanatical and only fit to become an inmate of a lunatic asylum, on the ground that their adoption would dangerously weaken a ship. The narrow ideas that formerly prevailed about such things are sharing the fate many kindred ones have suffered in this century, and, like them, must be consigned to ignominious oblivion. The sister bugbear in the minds of some, that the external appearance of a ship is injured by these ports, has also had to undergo violent death, and few are now bold enough to do honor to its memory.

The demonstration of their value was strikingly exhibited by comparing the sick-list of this ship with that of Her British Majesty's corvette *Modeste*, the two vessels lying together for several months in the harbor of Yokohama. The *Modeste* was provided with 25 ports to a side, 14 by 16 inches. Her sick-list was rarely greater, and frequently less, than ours, though having a complement of 250 men. This relative disproportion was particularly observable in regard to diseases of the respiratory organs. It is not necessary, however, to go beyond the narrow limits of the Yantic to appreciate the value of ventilation in connection with these diseases. These ports have been adopted in many English men-of-war, and it is coming to be regarded

among them as essential to have those ships intended for tropical cruising so fitted. The attention of any one at all interested in the subject of improved ventilation of ships of war is immediately attracted by this most decided advance in that direction. But not until those having their construction in charge are prevailed upon to admit that comfort is almost synonymous with health, can we hope to have ours rise to the standard ships of the present age should attain, viewed from a sanitary standpoint.

The steerage ventilation is effected by a hatch 5 feet by 3 feet 8 inches, opening under the break of the poop, and 5 air-ports 5½ inches in diameter, and is very defective, particularly as upon it is dependent that of various store-rooms in its vicinity. It is supposed to be aided by a door leading to the engine-room, but to open which, when under steam, the time most needed, proves so unpleasant that the occupants prefer its closure. The air-ports are placed but a few inches above the water-line, and therefore can only be opened in port, and not there if the surface of the water is disturbed by more than the gentlest ripple. There were two openings on the quarter-deck aft, now closed by dead-lights, intended for the accommodation of metallic ventilators reaching above the rail, for the benefit of the steerage. The sail-room, wardroom, and steerage store-rooms on one side, paymaster's, navigator's, and medical store-rooms on the other, with a narrow passage-way between leading from the steerage, are situated abaft it and below the ward-room. The bread-room is yet further aft, and beneath the cabin. The doors and bulkheads of these are of solid panelling, so that any air that strays from the steerage, seeking opportunity to perform its good office of purification, is forbidden entrance.

The ventilators alluded to should be kept in place, as they would constitute the most effective method of creating currents and thereby changing the air. The same improvement in air-

ports is desirable, but I doubt if it would be practicable to fit them with the present height between decks, owing to the necessary proximity of the apertures to the water. This, however, should be corrected. The depth of well is about 7 feet. From 6 to 8 inches of this could be beneficially dedicated to the space below by raising the deck to that extent; and I am told by those capable of judging, that the safety of the ship would be increased and her stability in no way impaired thereby. These remedies are the more important as there is no way by which a windsail can be conveniently adjusted. The doors of the store-rooms should be fitted with iron bars for the admission of air. The bread-room is badly cased, owing to which a great deal of bread has been destroyed by weevil.

The engine and fire rooms are as well ventilated and lighted as, from their position, is practicable, with one exception. An iron cylinder, at least 15 inches in diameter, should lead from the berth-deck to the fire-room. This would assist materially in the ventilation of the former, increase the draught and reduce the temperature of the latter when under steam, which averages about 45° higher than that on deck.

The berth-deck is 59 feet in length, and varies from 14 to 16 feet in breadth. It has three hatches, the main, of 30 square feet; central, 16; and forward, 6; each having a combing of 15 inches. The two last open under the top-gallant fore-castle. Besides these, are ten air-ports, 5½ inches in diameter, a little higher from the water than those of the steerage. Entire superficial area of aperture, 54 square feet. Of the air-ports, 6 only open directly upon the deck, one, each, being situated in the paymaster's issuing-room, yeoman's store-room, dispensary, and brig, and these do not add materially to the ventilation of the deck, even when open. The brig is, and has been for more than a year, used as one of the equipment store-rooms, men undergoing punishment being simply confined to the forward part of the



berth-deck—a much better arrangement, in my opinion. Considering the many obstructions to currents, the position and surroundings of the openings, and assuming 22 feet as the measure of aperture for ingress, after deducting the space occupied by the current of exit and ordinary ratio of friction, it is concluded that 25 feet per minute is a fair allowance for the velocity of the current of entrance during the day, yielding 33,000 cubic feet, and effecting 6.17 changes of air per hour. At night, owing to the diminished movement of the external atmosphere, and the greater resistance offered to entering currents, it is liberal to allow 10 feet per minute, or 13,200 hourly, with 2.5 changes.

When the ship was commissioned, and up to the time of reduction of the crew in 1875, the number of men quartered on this deck equalled her present total complement. They therefore then had, and would have now, if all were confined to this space, 268.3 feet hourly during the day, and 107.3 at night—a most deplorable deficit, taking 2,000 feet per hour as the normal requirement of a man, or even the minimum allowed by hygienic laws. The 13,200 feet of outgoing air, providing regular displacement took place, must have contained 123.5 cubic feet of exhaled carbonic acid, in addition to its original  $\frac{1}{10}$  per cent., or in all about 1 per cent.; 10.70 feet of this was discharged through the main hatch and air-ports, leaving 2,500 which could only find exit through the central hatch opening under the forecastle. Therefore those sleeping there, or some of them, had to inhale air charged to this extent with carbonic acid, together with other respiratory pollutions. To have supplied 2,000 feet to each man (and the conditions would be the same now if the ship were on a war footing), with the section area provided, would have required 246,000 feet per hour, the air entering at the dangerous rapidity of  $2\frac{1}{2}$  miles an hour.

During 1876, with an entire complement of 123, and allowing 25 to have been regularly billeted under the forecastle, 98 were left for the berth-deck. At the same rate as before, each man had 306 feet hourly during the day, 134.7 at night, and 98.2 feet of carbonic acid was exhaled, the discharged air containing 74 per cent., providing the whole amount was regularly carried off. It would be erroneous to suppose this to have been the case, however, a simple appeal to the senses, upon going on the deck at night, being sufficiently strong attestation to the contrary.

Were the number on board confined to the present actual allowance of 109, increased in case of war to 134, each man on the berth-deck would then have 154.7 —121.1 feet at night, and 393 —293.6 during the day, 84 to 109 occupying it. Still a very unhappy deficit.

In very cold weather the gun-ports under the forecastle are closed, a curtain is dropped aft, and it is almost impossible to prevent the men from shutting the bridle-ports and berth-deck air-ports to avoid draughts. Add rain or snow to the cold, and the main hatch has to be hooded, and thus the forecastle and berth-deck are converted into two closed boxes—one of 4,035 feet, allowing to each of its 25 occupants but 152 feet for the nine hours he is in his hammock, and the other, with its cubic space of 5,345 feet and 95 occupants, can only supply each with 43.6 feet for the nine hours, while 12 feet an hour of pure air is ordinarily required for actual respiration to preserve health. Under such circumstances, what is to become of the sick? Echo answers feebly, What? With present arrangements two cots only can be swung under the forecastle, and not without subjecting the sick to the heat and odors from the galley, abreast of which they have to be placed, and the noises incident to this thoroughfare. On the berth-deck, one on either side of the main hatch is all that can be swung with

any degree of comfort to the patients, and here they suffer from the disadvantages of being jolted by passers-by, the ill effects of darkness, and being forced to breathe an atmosphere already contaminated by exhalations from the lungs of 98 men. Yet such were about the conditions when the ship was at Shanghai during the first part of the year, and mention has been made of the large number of respiratory diseases that prevailed at that time. The effect of overcrowding was also strongly shown by the unhealthy and gangrenous sores that developed after the slightest abrasion or injury. The use of surgical instruments was altogether discarded, and I should not have felt justified in resorting to them, except under the demands of most urgent necessity. The fact that the efficiency of a ship of war is not alone dependent upon her locomotive qualities and the weight of the battery she may carry, but also, to a most extensive degree, upon the capability of her crew, this upon health, and this, in turn, upon general comfort, air-space, ventilation, and cleanliness of person as well as of planking, seems to be virtually disregarded. The more closely these various essentials harmonize, the more nearly to perfection does the ship arrive. To attain this desirable state of affairs mutual compromises in space have, of course, to be made; but in the construction of this ship these have been altogether one-sided, which makes her, from a hygienic view, a deplorable abortion, a floating sepulchre wherein to intomb health, and a monument to the sacrifice of common sense and firmly-established sanitary principles to notions most antiquated and perverse.

In proposing remedies for existing defects, the ends to be accomplished must be borne in mind. There should be at least 12 changes of air an hour on the berth-deck. To effect this, 64,140 feet must enter and be removed in that time (5,345 feet being the cubic space), and the apertures sufficiently large and well directed to admit that quantity, even

when the external air is moving at a moderate speed. Half the entire aperture of all the present air-ports can only afford 2,700 feet at a velocity of one foot a second. The proposed alteration in number and size of these would admit, at a like rate, 32,400 feet, or one-half the amount required. A hatch should be made on the forecastle forward of the fore-mast for the accommodation of a windsail through the central berth-deck hatch, and the metallic ventilator should be enlarged and lengthened; this, with the main-hatch windsail, would give three sources of inlet. All of these should be 18 inches in diameter, thereby admitting, at the same rate as before, 1,800 feet an hour, leaving but 1,000 feet to be furnished from other sources. The plan of utilizing the space between the timbers for ventilating, so common in merchant-vessels and foreign men-of-war, should be adopted, and would supply the 1,000 feet without relying at all upon the hatches. This would also be a serviceable method of ventilating the store-rooms, which are now practically without any ventilation.

The cylinder leading into the fire-room, that has been suggested, would be a most potent agent in preventing the accumulation of foul air on the deck and for maintaining currents and changes of air when at sea, the air-ports being then necessarily closed. Indeed there is no other way by which this could be rendered more certain. The break of the forecastle should be extended 8 feet further aft. This would still leave the main hatch uncovered except, as at present, by the boom-rack, would give berthing space to about 15 more men, making about 40 who could sling comfortably on the upper deck, relieve the berth-deck to this extent, and afford opportunities for rendering the sick more comfortable than is now possible. Notwithstanding the apparent disadvantages of the plan of keeping sick men on the open deck, it has been deemed far preferable to confining them to a

dark and unwholesome berth-deck or under the fore-castle, within a few feet of the galley, subjecting them to the heat, odors, noises, etc., therefrom. Even at sea, therefore, their cots have been slung on the spar-deck and only removed when inclement weather compelled it.

Lighting is ample in cabin and ward-room; deficient in steerage and on berth-deck. Enlargement of the air-ports would improve this. The dispensary is the worst lighted and most inconvenient apartment of the ship. It is 8 feet  $6\frac{1}{2}$  inches in length, 3 feet 5 inches broad above the counter, and 1 foot 10 inches between the drawers and bulkhead. A knee virtually divides it into two portions. In the forward portion are one air-port and the door. Here the writing and compounding have to be done. If, while holding sick-call, the surgeon desires anything contained in the dispensary he must rise and step out on the deck to permit the apothecary to go inside and procure the article; after he comes out again the surgeon can resume his seat and his work. Two persons cannot be inside together and do anything successfully, except to seriously incommode one another. As to the second portion, it is but one remove from the coal-mine of song, in which a ray of sunlight has never yet been found, artificial light being always required. There should be another air-port here, and one or two dead-lights set in the deck above. At least a foot or 18 inches in breadth should be added, and double doors provided for greater convenience in performing the necessary and important duties to which this space is dedicated, and for cleanliness.

In September, 1875, attention was called to the fact that no provision had been made for warming, and the introduction of steam-heating apparatus recommended. An estimate of the cost was made at \$581.18 and forwarded to the department. Nothing has since been heard from it. This estimate could have been reduced to \$404, as the necessary coils were, at

the time, in store at Nagasaki. In November following, the suggestion was repeated, and supplemented with one for the purchase of stoves for the relief of the then present and impending necessities. The latter was promptly complied with—one, each, being supplied to the cabin, ward-room, and berth-deck. The steerage was not so furnished because of the situation in that apartment of one of the shell-rooms. The occupants had, therefore, during the succeeding cold weather, to make themselves as comfortable as possible with blankets and a hot shot. The stove on the berth-deck was inadequate for the purpose intended, heating but a small area, and rendering it an easy passage from a torrid to a frigid temperature. Heating by steam is so far superior to any other method applicable to shipboard for regulating and maintaining evenness of temperature, that suitable appliances should never be neglected in fitting a ship. “The health and lives of the officers and men of the Navy are matters of too great importance to be entrusted” to the possible results of such improvisation. The greatest objection to its introduction in this ship is the want of a donkey-boiler, without which steam would have to be generated in one of the main boilers, causing a larger consumption of coal. By doing away with one furnace such a boiler could be put on board, and would not only be useful for heating but would perform most important service in the distillation of water, for which purpose one of the large boilers has now to be used, with the attendant disadvantage of imparting to it such oily and unpalatable qualities as to render it unfit for use until it has undergone extensive manipulation.

Water capacity, 2,000 gallons. Four iron tanks, of 500 gallons each, are provided for its reception. Average daily expenditure has been about 200 gallons. Owing to the comparatively inaccessible position of two of the tanks they cannot be cleaned on every occasion of being emptied, the hold having

to be broken out for this purpose. A flow-pipe connects them with the amidship-tanks. In consequence of the infrequency of being cleaned iron-rust rapidly accumulates, passes into the others, and of course affects all the water to the extent of its admixture. About 100 gallons at the bottom of the tanks are always rendered entirely unfit for use from this cause. I can see no reason why galvanized iron could not be used in their construction, and thus prevent this troublesome deposit. The custom of whitewashing the inside of water-tanks is injurious and should be abandoned. The principal source of supply has been from ashore, and though obtained at various ports no ill effects have resulted. Once, at Yokohama, I was inclined to ascribe to it a mild diarrhœa that prevailed among the men; but observation proved that new potatoes constituted the offending cause, and upon these being restricted the malady ceased. When at Canton, water was sent from Hong-Kong by steamer. As a precaution a carbon-silicate filter was purchased and placed over the scuttle-butt through which the water is made to pass before it is used for drinking. Subsequently another was procured for the officers. It is possible that to these may be attributed some immunity from infection, as the water at several ports is known to be impregnated with organic matter; but the important consideration as to whether or not the nature of this organic matter is harmful has not been stated. As a safeguard, however, it is best to assume that it is, and where proper condensation can be carried on it should be done in preference. On this ship, however, in addition to the imperfections already mentioned, no aerator having been furnished, the water is conveyed immediately from the condenser to the tanks without any opportunity whatever for becoming oxygenated, and at an average temperature of  $110^{\circ}$ , which, added to its impregnation of oily odor and taste, renders it wholly unfit to fulfil the requirements of the system. For the correction of

these defects it was suggested, in July, 1875, that it should be forced from the distiller into a receiving-trough placed on the spar-deck, passing from this over a succession of inclined shelves, there to be broken up by small obstructions, and conducted thence into the tanks cooled, aerated, and ready for use. The whole contrivance was estimated to cost \$90.47. Before a measure involving the expenditure of this sum, and the boring of an auger-hole through the deck to lead the necessary pipe could be adopted, it was decided it must be referred to the department. This proved its death-warrant, for it either quietly dropped into a pigeon-hole marked "oblivion" or reached Washington with too little vitality to stand another thirty days' trip across the continent and the Pacific Ocean. Whenever the condenser is, through necessity, employed, the water has to be pumped on deck after its reception in the tanks, and made to run over a trough, about 8 feet in length, into a starting-tub; again it is carried to the tanks, and the process repeated until it becomes fit for use. This simple and rude invention was improved upon by tacking a piece of perforated tin over the lower end of the trough, greatly aiding aeration. This pumping has to be kept up continuously while distillation is going on, the men being relieved every hour. Having now started on voyage homeward, an approximate estimate can be made as to the quantity of water that will be required by condensation during the passage. This is put at 16,000 gallons. As all of it has to make at least two circuits, before described, in order to become potable, 32,000 gallons must be pumped, and as the raising of one gallon to the deck represents the expenditure of 88 pounds of muscular force, 2,816,000 pounds will be so expended, which could have been saved by an investment of \$90.47.

Fresh provisions have been issued four times a week when in port, consisting of beef, potatoes, cabbage, turnips, and carrots. These vegetables, though less esculent than those of



our own country, are, when well prepared, quite palatable. Cooking has been good. The only inferior stores that have been on board were procured from the naval store-house at Nagasaki. Many of these required condemnation at once. Some bore marks of 1863 as the time of their inspection in the United States, and were, of course, subjected to long sea-voyages before getting to Nagasaki. Their actual antiquity is a matter for conjecture. Almost every article in the store-house, with the exception of tobacco and pork, can be purchased cheaper on the station and with the greater recommendation of freshness. This would, in my opinion, be the better method of supplying our ships.

Clothing has been furnished by native tailors at about a third less than that supplied by the government and fits the men much better. By inspection before it is received, the proper color and quality can always be obtained. Shoes have also been purchased ashore and proved much more satisfactory to the wearers than those furnished to the ship. Even in hot weather the men have not been allowed to discard their undershirts, as much of the intestinal derangement common on the station is due to careless exposure of person to changes of temperature, particularly at night. This is the simple explanation of the efficacy ascribed to flannel abdominal bands worn by most residents.

During the past summer cork helmets were adopted as uniform for the officers and straw hats for the men, and gave them a much more seasonable appearance in dress than they would otherwise have presented. There should be some express regulation on this subject, as cloth caps are too heavy and fit the head too closely for summer wear. The addition of a white cover fails to do away with either of these objections.

Mention has been made of men being transferred to this vessel from others to await transportation and of those sent from

the Naval Hospital at Yokohama on account of misconduct. Under the first head eight were received from the Tennessee and retained 18 days, and two from the Kearsarge, 17 days. From the hospital six were sent because of complaint made by Surgeon Coles as to the inadequacy of his police-force to control men who were convalescing and disposed to be obstreperous. This was responded to by an order to transfer such men to the Yantic. They were, of course, generally unfit for duty and only served to occupy valuable space and swell the sick-list on this ship. It so happened, too, that when some of them were received the very ship to which they belonged was in port, and much more capable of providing for sick and punishing offenders. This ship, particularly after being condemned as rotten, is not adapted for a way-side inn or for hospital or prison ship.

I cannot too urgently call attention to the subject of the present unfavorable position of the water-closets of our ships, as provided for the use of the crew. The subtle and continuously recurring injuries that result from this cause are incalculable. From their situation, those who employ them are subjected to every conceivable vicissitude of temperature and weather, and under circumstances most disadvantageous; for men, called at dead of night to obey the dictates of natural desires, and forced to leave comfortable hammocks, do not think, or take time, to dress, don water-proofs, etc., but with perhaps nothing more than an undershirt, and perchance in a state of perspiration, expose themselves to whatever the weather may be, regardless of the consequences. It is enough to imagine men in perfect health thus compelled to confront a temperature at or below freezing-point, with rain or snow or sleet and winds, but when we consider that those already reduced by sickness, "with fevered brow and palsied step," are forced to share the same discomfort, it justifies the belief that this is a relic of more barbarous ages, unworthy of our boasted advancement, and which should be

hastily done away with. The remedy is to have suitable water-closets constructed under the fore-castle. The only objection that can be urged is the supposed liability to unpleasant odors. This is not tenable, however, for, with the disinfectants and deodorizers in our possession, this should never become a valid objection. Those for the officers could be placed on the star-board side, and the port side be devoted to the use of the men. There is ample room, even on ships of this class, and they are about the only ones on which the question of space would arise; and by extending the top-gallant fore-castle, as has been proposed, this would be materially increased. A urinal should be forward of the closets. For any possible inconvenience dependent upon this alteration that any one in any department could be subjected to, the increased comfort that would inure to the men and the better preservation of their health should be sufficient compensation.

The necessity of exercising great care in the examination of men for enlistment is also a matter to which I invite attention. Its importance cannot fail to be impressed on the mind of any medical officer at sea. There is now always to be found on every ship a class known as "old man-of-war men." They are in truth old, and the man-of-war propensities are strongly displayed when one of these ancient mariners is requested to state his age. Changing his quid to the other side, and with a touch of his cap, he answers with praiseworthy nonchalance, "Thirty-five, sir," while the silvered locks, furrowed brow, and stiffened joints proclaim that only a few more sand-grains remain in the time-glass of his scriptural longevity. Some few of these men, it is true, retain vigor disproportionate to age, but for the sake of the few the majority should not be kept from where they belong, the Naval Asylum; or, if duty is to be given them at all, let it be at navy-yards or on receiving-ships, where the arduous services of ships in commission are

not demanded. There is another set, dolts, who are always in trouble on shipboard because of their ignorance of the duties expected of them, and their inability to learn, owing to the low order of their mental faculties. They enlist in the Navy because no employment can be obtained ashore. Others, again, present the stamp of rascality so plainly on their faces that it, too, should be held a disqualifying cause, though not in the range of a strictly physical examination.

For the irregular enlistment on ships in commission a board of three officers should be appointed, two of whom should be the executive and surgeon. They should examine the candidate on deck as to his ability to perform the duties pertaining to the grade he is intended to fill; gleanings from his former history should be obtained, and his *tout ensemble* taken in consideration. In many cases the surgeon could at once perceive physical disabilities, rendering further examination unnecessary; and disqualifying features that might escape the notice of one examiner might suggest themselves to another. This is the more important as, consequent upon the darkness, noise, and confined space on berth-decks, thorough and satisfactory physical examinations are impossible. Many diseases and deformities escape detection in this way that, under better circumstances, would be apparent.

Regulation should forbid the permanent employment of men in the capacity of berth-deck cooks. Such men can almost always be singled out at a glance from the ship's company on account of their etiolated appearance, particularly on double-decked vessels. No one should be allowed to hold the office for a longer period than a month without change.

It is fully appreciated that, from casual reading, the foregoing suggestions are liable to be denominated as sweeping, but nothing of practicability is lost on this score, since the con-

dition of the ship is such as to render her unfit for further service without amounting to virtual rebuilding.

*Meteorology.*—A record of observations under this head has been several times attempted, but the many palpable inaccuracies dependent upon the imperfection of the instruments on board rendered the result worthless as a basis of scientific deduction.

On the 1st of January, 1876, the Yantic was at Nagasaki, Japan. The following table will show what ports have been visited since and the time of such visits:

From—	Date of departure.	To—	Date of arrival.
Nagasaki, Japan .....	January 14....	Shanghai, China .....	January 17.
Shanghai, China .....	March 22 .....	Amoy, China .....	March 27.
Amoy, China .....	March 31 .....	Macao, China .....	April 2.
Macao, China .....	April 9 .....	Hong-Kong, China .....	April 9.
Hong-Kong, China .....	April 25 .....	Canton, China .....	April 25.
Canton, China .....	May 18 .....	Hong-Kong, China .....	May 18.
Hong-Kong, China .....	June 8 .....	Nagasaki, Japan .....	June 18.
Nagasaki, Japan .....	June 19 .....	Yokohama, Japan .....	June 23.
Yokohama, Japan .....	December 4...	Nagasaki, Japan .....	December 10.
Nagasaki, Japan .....	December 12..	Hong-Kong, China .....	December 18.
Hong-Kong, China .....	December 24..	At sea.....	December 31.

Excepting Macao and Canton, the medical topography of the above places has already been so fully reported that repetition is unnecessary.

Macao is on the point of a peninsula making from the southern extremity of Hiangshan Island, and 40 miles from Hong-Kong (latitude  $12^{\circ} 11' 12''$  north, longitude  $113^{\circ} 33'$  east). It was settled by the Portuguese in the fourteenth century, and soon became a place of considerable commercial importance, but was also renowned as the headquarters of pirates and birth-place of typhoons. Latterly, overshadowed by its rival, Hong-Kong, and almost destroyed by one of its own offspring, its glory has departed. There are still extensive ruins of what may have been imposing structures, built after the old Portuguese style. Its possession is retained by that nation, and held in

some reverence on account of its having been the residence of Camöens, the ruins of whose gardens are lauded to strangers and are quite well worth visiting. A small garrison and a gun-boat are constantly kept there. Its revenue, chiefly derived from licensed gambling at the game of fantan, scarcely suffices to pay the governor and government officials. It is hilly, hot, and dirty; the streets are narrow, crooked, and damp; the houses dark and dismal, with windows guarded by prison-like bars. Population about 10,000, principally Chinese, who are among the most inferior representatives of their race; generally speaking, a syphilitic mass. The Portuguese inhabitants, outside of the officials, are the sadder, poorer, perhaps wiser, for having worshipped at the shrine of fantan, "not wisely, but too well."

Venereal diseases in all phases, variola, and malarial fevers are common. There are two hospitals, a military and native. The former is a large red-brick building, with an elevation of about 200 feet, and is the most prominent edifice upon entering the harbor. Its external appearance and surroundings are good, but the internal architectural arrangements are miserably adapted. The bedsteads, bed-clothing, and furniture generally, are in keeping with the poverty of the town, but not with hospital requirements. It is capable of holding (I will not say accommodating) about 100 patients. No meteorological records could be obtained. No charitable institution, no medical publications, no progress of medical science exists, or is likely to exist, the institutions to be mentioned in the historical outline of medical missions being closed.

*Canton.*—Latitude  $23^{\circ} 07'$  north, longitude  $113^{\circ} 15'$  east, is on the left bank of the Choo-Kiang or Canton River, 70 miles from its mouth and 89 miles from Hong-Kong. A fine view of the city and surroundings may be obtained from one of the many pagodas. A wall 7 miles in circuit encloses it. A second

wall divides it into the old and new cities, in the first of which are the residences of the viceroy and officials, the arsenal, etc. At several points the walls have small guns mounted upon them. The houses, built of brick, are of the same general size and character. The streets are better paved and cleaner than in most Chinese cities, and the usual offensive odors are less noticeable here in the thoroughfares. The people themselves, though less stalwart than their northern brethren, are of lighter complexion and far more intellectual in appearance. The population, stated to be between two and three millions, is probably overestimated, as no reliable census has been taken. Much of it is floating. The markets are well supplied with mutton, pork, game, and vegetables. Water is gotten from springs and the collection of rain-water in cisterns. The soil is alluvial, low, and flat, in many places submerged when the river rises to unusual height. The river-water is always excessively muddy and contains various alkaline salts, yet many laborers and fishermen use it for drinking purposes, causing the very large number of cases of urinary calculus found among those classes. The basis of the stone is almost invariably uric acid. Foreign residents, 90 in number, are on the island Shamien. It is hard to realize that this now beautiful island, well stocked with shade-trees and grass, and with many handsome residences and promenades, was but a comparatively few years since a simple mud-flat. The general health of Canton is better than that of other places, owing to its greater cleanliness, etc.; still, small-pox sometimes commits fearful ravages. Syphilitic affections are common, and leprosy is frequently met with. Pulmonary phthisis destroys a large number of inhabitants, and many and various deformities resulting from mal-nutrition are seen.

The only hospital is that under control of the American mission. It is capable of accommodating about 100 patients. The edifice was not originally intended for hospital purposes, and

possesses few architectural conveniences. The furniture is the rudest possible. Plain boards stretched across benches, with matting laid over, constitute the bedsteads, and a few bamboo stools complete the outfit. It is not attempted, and would be useless, to supply other, as Chinamen would not like it. Upon his reception each patient pays a few "cash" for the cleaning of the building, etc. Nothing more is required. The principal operations performed are lithotomy, lithotrity, and circumcision, though there are a large number for cataract, entropion tumors, mostly non-malignant, necrosis, fistulæ, and harelip. Total number of operations of lithotomy up to April, 1876, 345; lithotrity, 88. Total weight of stone removed by lithotomy 408 ounces; average, 1.15 ounces.

The following is a tabular list of operations for stone, classified according to age in decennial periods, extending from 1854 to January 1, 1876:

## LITHOTOMY.

Age.	Operations in 1875.	Deaths.	Total operations.	Total deaths.
Under 10 years .....	9	0	63	3
10 and under 20 .....	10	0	73	3
20 and under 30 .....	8	0	63	3
30 and under 40 .....	3	0	63	3
40 and under 50 .....	1	0	35	2
50 and under 60 .....	0	.....	27	4
60 and under 70 .....	0	.....	7	3
70 and under 80 .....	0	.....	1	1
	31	0	332	26

Mortality 7.8, or one in over 12.



## LITHOTRITY.

Age.	Operations in 1875.	Deaths.	Total operations.	Total deaths.
20 and under 30.....	2	0	12	0
30 and under 40.....	3	0	17	2
40 and under 50.....	6	0	20	1
50 and under 60.....	5	1	15	1
60 and under 70.....	2	1	17	3
70 and under 80.....	2	1	6	1
	20	3	87	8

Mortality 9.2, or one in 11.

In cataract operations section is made in the lower segment, being easier of practice to the Chinese pupils, of whom there are about fifteen. Some operate with great dexterity and enviable steadiness of hand. Chinese patients display no dread of the knife in the hands of a foreign surgeon, and willingly submit to any operation. To this confidence much of the success met with must be due.

#### HISTORICAL OUTLINE OF MEDICAL MISSIONS AT CANTON, HONG-KONG, AND MACAO.

1805.—Vaccination introduced at Canton by Dr. Pearson, physician to the East India Company. His assistant, Yan, continued it, and it is still carried on by his son.

1820.—Dispensary opened at Macao.

1827.—Eye infirmary opened at Macao by Dr. Colledge, of the East India Company. Six thousand cases were treated up to the time of its closure, in 1832.

1828.—Dispensary opened at Canton.

1835.—Ophthalmic hospital opened at Canton; closed in 1854; 53,721 cases.

1838.—Medical missionary society organized at Canton.

1841.—Dispensary opened at Hong-Kong.

1843.—Hospital built at Hong-Kong, and continued till December, 1847; 8,421 patients treated.

1845.—Dispensary opened at Canton.

1850.—Dr. Hobson published in Canton the Tsiintai-sau-lun, an Outline of Anatomy and Physiology—the first work on scientific medicine ever published in China. It was followed by volumes on Surgery, Practice of Medicine, Midwifery, and Natural Philosophy, which have had extensive circulation.

1851-'54.—Other dispensaries at Canton.

1856.—Ophthalmic hospital and most of the dispensaries closed in consequence of war with England.

1857.—F. Wong, M. D., a native of China, arrived from England, having graduated in medicine at the Edinburgh University, and was the first Chinaman on whom a medical diploma was conferred. On his arrival at Hong-Kong he opened a dispensary, but is now in extensive practice at Canton.

1858.—Dr. Wong opened the Kam-li-fau Hospital at Canton, and conducted it until 1860, when it was transferred to the medical mission under Dr. Kerr, and finally closed in 1870.

Besides the books already mentioned, a work on *Materia Medica*, Bandaging, and a translation of Gray's *Anatomy*, under the supervision of Dr. Kerr, formerly in charge of the missionary hospital,\* have recently been published. The native pupils display great aptness and interest in their studies.

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#### U. S. S. ALERT.

REPORT OF PASSED ASSISTANT SURGEON HENRY M. MARTIN.

The Alert left New York May 26, 1876, for China via the Suez Canal, having been employed during the previous year along our own coast from Boston to Port Royal, S. C. On the 26th of June, 1876, she reached Gibraltar, having been thirty-

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\* Now under the care of Dr. I. F. Carrow, of Maryland.

one days in crossing the Atlantic. During this passage she had the good fortune to enjoy very good weather, with the exception of one gale of wind of about five days' duration, which she encountered soon after leaving New York. During this gale the Alert displayed very good qualities as a sea-boat, being easy as regards motion, and comparatively dry.

After a delay of one week at Gibraltar, she proceeded on her voyage, stopping for a short time at each of the following places, in the order mentioned: Malta, Port Said, Suez, Aden, Singapore, Hong-Kong. Our short stoppages at these different ports, together with other circumstances, rendered it impracticable to obtain topographical statistics of any value.

During the whole time from New York to Hong-Kong the health of the ship continued excellent. At all of the foregoing places, with the exception of Aden, the water used for drinking on board was obtained from shore, and in all cases it was found quite potable, and no cases of disease came under my notice subsequently which could be attributed to its use. The water used at Aden was water distilled on shore, and was of quite good quality, though somewhat inferior to the product of our own distillers.

A fact worthy of mention, observed during this passage, is the freedom from venereal disease enjoyed by the ship's company, which immunity is, without any doubt, to be ascribed to the system of inspecting prostitutes. This system is, I believe, rigidly enforced in all the places visited by this vessel in her voyage from New York to Hong-Kong. In Hong-Kong the regulations upon this subject are very strict and thoroughly carried out. From diseases of other kinds during the same period we were comparatively free, the cases on the sick-list being cases of slight accidents or trivial affections. The only exception to this rule was the case of one of the crew who had been suffering from chronic dysentery since leaving New York, and who died subsequently at Singapore.

The Alert left Hong-Kong September 18, and since then has visited the following places: Swatow, Amoy, Foo-Chow, Ning-Po, Shanghai, Nagasaki. During this time the ship's company enjoyed very good health, but the average sick-list has been somewhat larger than before our arrival on the station. Quite a number of these cases have been of derangements of the digestive functions and of venereal infection, the latter consisting principally of gonorrhœa and chancre. No cases of unequivocal constitutional infection have come under my notice during this time. A number of cases of acute diarrhœa have been observed, the cause of which has not been satisfactorily determined.

During our cruise along the China coast from Hong-Kong to Shanghai, the water for drinking was sometimes procured from the shore and at others distilled aboard, my recommendation upon this point being usually followed. At Shanghai, water distilled aboard was alone used for drinking. In cases where we obtained our drinking-water from the shore, I found no ill effects follow its use. If any of the above-cited cases of diarrhœa owed their origin to this cause, I think it was due more to the difference in the qualities of the different waters than from impurity of any particular specimen, for I found it a rule that after using for a short time the water from any particular place the men seemed to grow accustomed to it and ceased to be affected by it unpleasantly. At the same time, I cannot but concur in the opinions of nearly all the medical officers upon this station, that the safe rule is to use no shore-water for drinking on the China coast except, perhaps, that obtained at Hong-Kong.

The berth-deck of the Alert usually contains billets for from 70 to 75 men, and under the top-gallant fore-castle there are slung usually about from 30 to 35 hammocks. The cubic air-space of the berth-deck amounts to 11,431.72 cubic feet, and that

under the top-gallant forecastle to 6,125 cubic feet. The ventilation of the berth-deck is very thoroughly accomplished by means of three hatches, which, with the aid of windsails, in warm weather, admit a free supply of air. There are also the usual air-ports, which can be used as additional means of ventilation when the weather permits. The steerage, with an average population of seven persons, has a cubic air-capacity of 2,781.94 cubic feet, and is quite freely ventilated through a large square hatch and four air-ports. The wardroom, containing nine rooms, is well ventilated by a hatch in the forward portion, and a ventilator aft, which was placed in the ship previous to her departure from the United States. The cabin is quite commodious, and possesses in its ports and two small hatches opening from the poop-deck the means of good ventilation whenever desirable.

The heating of the ship is effected in cold weather by means of steam-coils, of which there are two on the berth-deck, one in steerage, one in ward-room, and one in cabin. This method of heating has thus far been found quite satisfactory.

The food of the men at sea has consisted mainly, of course, of the usual Navy ration; but permission has been given to the messes to obtain, before leaving port, a supply of potatoes or other vegetables whenever it has been practicable to stow them. In port the food has been of sufficient quantity and good quality, fresh meat and vegetables being furnished as often as necessary.

The usual Navy supply of clothing has been issued to the crew, with an occasional arrangement by which they have been enabled to purchase certain articles ashore when economy or comfort has seemed to make it desirable.



NORTH ATLANTIC STATION.  
1877.





## NORTH ATLANTIC STATION.

### U. S. FLAG-SHIP POWHATAN.

#### REPORT OF FLEET-SURGEON M. BRADLEY.

I submit the following condensed report of the Powhatan, with a brief prefatory description of the vessel, armament, and engines. The history of the ship, during her long and active service in war and peace, has been so often written and commented upon it is unnecessary to revert to it here.

Powhatan was built at the navy-yard, Portsmouth, Va., and launched in February, 1850; is a side-wheel paddle steamer, of live-oak, barque-rigged, and registers 2,182 tons; length over all, 281 feet; between perpendiculars, 250 feet; breadth of beam, 45 feet; breadth over all (outside of paddle-boxes), 71 feet; depth of hold, 26½ feet. When equipped for sea, draft of water forward, 19 feet; draft aft, 20 feet; diameter of paddle-wheels, 34 feet; length of paddles, 10 feet; breadth, 16 inches.

Armament, 16 guns, 8 on broadside: 2 100-pound Parrott (rifled), and 14 IX-inch Dahlgren (shell), all mounted on wooden (Marsilly) carriages.

Engines, 2; simple inclined direct-acting; maximum indicated horse-power of each 1,100; boilers, 4 (iron), with horizontal fire-tubes; number of furnaces, 24; greatest speed under steam full boiler-power, 11 knots 4 fathoms per hour; two-thirds power, 9 knots 6 fathoms; quantity of fuel consumed per hour, full speed, 4,480 pounds; quantity for two-thirds speed, 3,130 pounds. Capacity of bunkers, 630 tons anthracite coal. Distilling apparatus, with aerator, furnishes 70 gallons of potable water per hour.

United States ship Powhatan, flag-ship of the North Atlantic Squadron, bearing the broad pennant of Rear-Admiral S. D. Trenchard, Capt. T. S. Fillebrown commanding, and carrying 338 souls, sailed from Norfolk, Va., 10.30 a. m., Saturday, January 26, current year, and after a passage of eight days, half calm, half stormy, entered the Caribbean Sea by the Virgin Passage, and anchored in the crater-like bay of St. Thomas; distance run, about 1,350 miles.

Caribbean Sea is that part of the great Atlantic washing the northern coast of South America, limited on the north by the Greater Antilles, Cuba, Hayti, Porto Rico, and the Virgin Group; on the east by beautiful islands forming a gentle curve running nearly north and south, collectively the Caribbee of the English, windward of the Spanish, French, and Dutch, and individually named after saints found in the ecclesiastical calendar; on the south by Venezuela and New Granada, the Spanish main of West India merchantmen; on the west by Honduras, Yucatan, Nicaragua, and Costa Rica. Greatest length east and west, 1,730 miles. On the southwest the Caribbean is separated from the vast Pacific by a neck of land only 40 miles across—the Isthmus of Panama. The places just mentioned are within the northern tropic, consequently within the influence of the northeast trade-wind.

On the declination of the sun, north or south of the equator, and his diurnal position above or below the horizon, depend the direction, duration, and force of the wind, land and sea breezes, and the so-called rainy and dry seasons. In the West Indies the rainy season, also the sickly, commences in June, when the sun is in the sign of Cancer and the wind southeast, and ends in December. The dry season begins about December, when the sun is in Capricorn and the wind northeast. Rain, however, is not uncommon. In June it falls in torrents. Hurricane season extends from the middle of July to the latter part of October.

The Greater Antilles have the usual land and sea breezes, while the Caribbee Isles, owing probably to their smaller size, have little or none. Even the trade-wind dies away at the sinking of the sun, only to blow with greater vigor the following morning.

Of the Virgin Islands discovered by Columbus on St. Ursula's day, and numbering nearly a hundred, the most important are St. Thomas, Virgin Gorda, Tortola, and Santa Cruz. The ship having touched at the first and last, it will only be necessary to speak of them.

St. Thomas, in possession of Denmark, is a rugged, volcanic isle running east and west, 12 miles long by 3 broad. A range of hills, whose greatest elevation is 1,500 feet above the sea-level, traverses its whole length, and is scarred and seamed by the elements into gullies, chasms, and ravines. The island is nearly denuded of wood, and the productions are barely sufficient for the population.

St. Thomas has lost much of its commercial importance; has, in fact, become only a port of call, the merchants of the adjacent islands do their own importing, and thereby save all discounts, intermediate profits, and commissions, at the same time avoiding the vexatious delays of change and the exorbitant charges of the middlemen of St. Thomas.

The picturesque town of Charlotte Amalia is located on the southern side. Three spurs run from the background of high hills to the edge of an elliptical bay not unlike the handle of a door-key, and on them the one and two story houses with red roofs, fronts and sides painted in all the prismatic hues, are piled seemingly on each other, overlooking the bay and facing the sea.

Prior to 1871, St. Thomas was considered one of the unhealthiest of the West Indies, and it would still have the same unenviable reputation had not the authorities awakened to the

necessity of adopting more stringent hygienic measures ashore and afloat. The lazaretto is located on the bluff to the right, entering the harbor. The Marine Hospital, in the western part of the town, is under the patronage of merchants; is seldom open for the reception of patients. The Roman Catholic Hospital is supported by voluntary subscriptions. A few ladies attend the sick gratuitously. The number of patients is limited. The Military Hospital, in the upper end of the town, is under the supervision of Surgeon Erickson, and is in good order, clean, and well ventilated. Charge per diem, man-o'-warsman, \$3; for a sailor of the merchant marine, \$5. The excuse offered and accepted for the high charge of the institution is that the authorities do not levy a hospital-tax on vessels entering the harbor. Population of Charlotte Amalia, 14,000. Average barometer on ship for 4 days, 30.10; of thermometer, 84° Fah.

Santa Cruz, or St. Croix (Danish), south of St. Thomas, distant 40 miles; greatest length east and west, 19 miles; is rolling, hilly, of volcanic origin, and like its neighbor subject to earthquakes. In the hurricane season, from July to middle of October, violent winds sweep over the island, uprooting trees, carrying away sugar-factories, and frequently destroying life. The island is more productive and better wooded than St. Thomas. The endogens, bananas, cocoa-nuts, and palms cluster around the towns and huts. Here and there are seen the exogens, tamarind, mahogany, and the huge wide-spreading silk-cotton tree, called by the natives ceiba (*Eriodendron anfractuosum*), while all the fruits of the tropics are produced in season.

The whole island is under cultivation, divided into plantations called estates, yielding sugar-cane in abundance. Chief exports, sugar, molasses, rum, and bay rum. Population, 26,000, eight-tenths of whom are negroes and mixed.

Christianstaed, on the north side, is the capital of the island

and the seat of government of the Danish West India colonies ; population, 5,000.

Frederickstaed, on a commodious bay at the western extremity of the island, is the chief commercial town ; population, 4,000. At present Santa Cruz is tolerably healthy, there is no small-pox or yellow fever ; a few cases of malarial fever, of a mild type, dysentery, and diarrhoea are reported ; ophthalmic affections and walk-about cases of elephantiasis are common.

The hospital in Frederickstaed is located on the beach, an unpretending structure, 40 by 50 feet, two and a half stories, with two small out-wards for women ; is as much poor-house as hospital ; consequently the accommodations cannot be said to be excellent ; it contains at present 36 patients, of whom one-fourth present the variety of syphilis (frambesia) known in the West Indies as *yaws*. Average barometer, 4 days, 30.21 ; thermometer, 83° Fah.

Steamed out of Santa Cruz Harbor noon of February 12 for St. Christopher, passing on the right Saba (Dutch), a volcanic island, two and a quarter miles in diameter. The nearly central peak frequently obscured by clouds towers to the height of 2,280 feet. In the dim, hazy distance east by north loom the islands St. Martin and St. Bartholomew, Marts and Barts of the unpoetic English traders. St. Eustatius (Dutch), with his slumbering volcano 1,950 feet above the sea, forms the next link in the Caribbean chain, and is separated from the following by a channel six miles wide.

St. Christopher (English), well known as St. Kitts, discovered by Columbus and named by him after his patron, the giant Saint Christopher, like the foregoing is volcanic, 18 miles long north and south, by 6 broad. A lofty ridge runs nearly its whole length. Highest point, Mount Misery, between 3,700 and 4,300 feet. The western side of the ridge slopes more



gently to the sea than the eastern, and is cut into deep gullies, probably by the action of water, and the water again may have carried the disintegrated impalpable rock to form the fertile plains below. Doubtless countless ages have elapsed since the first dew-drop trickled over the ash and lava and marked by its descent the initiatory course which has become the channel of a mountain torrent. Exports same as those of Santa Cruz, with the addition of arrowroot (*Maranta*) and other farinaceous articles. Population, 2,400, which is only approximate, there being no reliable statistics in any of the islands on which to base facts and figures.

Basse Terre (low-land), at the southern end, is the chief town, politically and commercially considered; population, 6,000, mostly negroes, who are indolent, impudent, and provokingly importunate in their demands for alms. The Mongolians, coolies and Chinese, are the hewers of wood and drawers of water. The town is plentifully supplied with water from natural reservoirs in the mountain range. The market furnishes tolerably good beef and mutton previously fed on Guinea grass (*Panicum jumentorum*), which is tall and grows in tufts all over the island; fruits and vegetables in abundance; sweet sop (*Anona squamosa*), sour sop (*Anona muricata*), custard-apple (*Anona articulata*), chirimoya (*Anona chirimolia*), bread-fruit, plantain, yam (*Dioscorea*), and cush-cush (*Colocassia esculenta*).

At the upper end of the town is the general hospital, endowed by a philanthropic Scotchman named Cunningham, consisting of four substantial buildings, respectively occupied by male patients, medical and surgical; females, medical and surgical; obstetrical cases; and, lastly, by that very unfortunate class of beings, the insane. The institution is in good condition, clean, well ventilated, and doubtless affords the assistance and comfort the beneficent founder so ardently desired. It is frequently

spoken of as the Cunningham Hospital. Average barometer, four days, 30.17; thermometer, 83° Fah.

Steamed out of the harbor of St. Christopher on the morning of 18th February, and arrived at St. Pierre, Martinique, next day, after a run of 27 hours. On the trip down, passed in full view of Nevis (English), the summit of whose conical volcano, 4,000 feet above the sea, is nearly always obscured by clouds. Nevis is separated from St. Christopher by a dangerous channel—the Narrows—shallow, filled with rocks, and a little over a mile wide. Next island, Monserrat (English), named after its fancied resemblance to the huge mountain back of Barcelona, Spain. Guadeloupe (French), next appeared on the panorama, followed by Dominica, but as night had set in were not distinctly visible.

Martinico, Martinique (French), discovered by Columbus in his first voyage, 1493, and settled by the French one hundred and forty years afterward. The island runs nearly north by west and south by east, irregular in form, 35 miles long, and varying in breadth from 8 to 16 miles; volcanic, very lofty, abrupt and bold on the west side; highest points, Mount Pelée, in northern third of island, 4,500 feet; Pitons du Carbet, 4,000 feet, in the middle third, and the peak of Vauclin may be said to occupy the lower third, 1,600 feet.

The royal palm rises to the height of 80 and 100 feet; coconut-palm, fan-palm, tamarind, india rubber, and silk cotton flourish luxuriantly. All the tropical fruits are found in Martinique, as well as most of the vegetables—bread-fruit, banana (*Musea sapientum*), guava apple (*Psidium guava*), avocado, or alligator-pear (*Persea gratissima*), sweet potato (*Ipomœa batatas*), ochra (*Abelmoschus esculentus*), with its pods of mucilaginous seeds, oranges, lemons, and limes, can all be seen growing in the botanic garden; rich, fragrant flowers in profusion, frangipani, tube-rose, night-blooming cereus, and the different

varieties of yellow and white jessamine. The venomous "*fer de lance*," rat-tailed snake (*Craspedocephalus lanceolatus*), and its enemy, called by the natives, cribo snake (*Coluber variabilis*), the large centiped (*Scelopendra*), poisonous scorpions and tarantulas, harmless chameleons and lizards, are found all over the island. Staple articles produced for exportation, cotton, aloes, sugar, molasses, and dye-woods, arrowroot, cacao, and vanilla, *liqueurs*, *crêmes*, and *sirops*. Population, 130,000.

St. Pierre, western side, on an open roadstead at the junction of the northern with middle third, is the chief town, with a population of 27,000; regularly laid out, streets paved and furnished with deep double gutters, along which mountain streams rapidly flow to the sea. The caserne (barracks) has accommodations for 10,000 men; l'hospice (almshouse) gives shelter to the poor and incurables. Hôpital militaire, in middle of the town, is in excellent condition, and receives all classes of patients for a moderate compensation. Average barometer, 2 days, 30.09; thermometer, 84½° Fah. Although this is the dry season (February), showers are heavy and not unfrequent.

Fort de France, also on western side of the island and on the north bank of Fort Royal Bay, distant from St. Pierre 11 miles, has a large military hospital in good order. Principal cases at present, intermittent and remittent fevers, rheumatism, hepatic affections, dysentery, diarrhœa, various forms of syphilis, and numerous cases under surgical treatment. Population, 13,000. Average barometer, 30.14; thermometer, 84° Fah.; clear weather.

Steamed out of Fort Royal Bay 1 p. m. February 23, and arrived next day, 3 p. m., at Barbados; distance run, 139 miles.

Barbados, discovered by the Portuguese, settled by and now in possession of the English, is the farthest eastward of the Windwards, 18 miles long by 12 broad, and of volcanic and coralline formation. The limestone is soft, easily quarried and



cut into blocks for building purposes. Exports, sugar, cotton, aloes, arrowroot, and ginger. Population, 165,000, nine-tenths of whom are negroes and mixed.

Bridgetown, on Carlisle Bay, is the capital; contains the houses of parliament, cathedral, barracks, and military hospital. Cases of ophthalmia and cataract, produced by minute particles of calcareous marl from the dusty roads, are numerous; Barbados leg and foot (elephantiasis), common. The island is considered one of the healthiest of the West Indies, notwithstanding it has been frequently visited by the scourges yellow fever, small-pox, and cholera. Average barometer, 5 days, 30.11; thermometer, 84° Fah.; clear weather.

Sailed from Barbados, 5.30 p. m., February 27, and arrived next day at St. Vincent.

St. Vincent, discovered by Columbus in 1498, has been in possession of the English over 100 years; is 13 miles long, north and south, by 8 broad, separated from St. Lucia by a channel 22 miles wide. To the south are Bequaera and the Grenadines. The island is volcanic; loftiest peak, Mount Soufrière (sulphur-mine), 3,000 feet above the level of the sea; two craters; one, full of water, resembles a lake, and is 800 feet deep. The volcano suddenly burst forth in 1812, and the dust and ashes fell in Barbados, 90 miles distant. Exports, mace (*Macis*), nutmeg (*Myristica moschata*), arrowroot (*Maranta*), and the cacao-nut, or bean, the fruit of the *Theobroma cacao*, large quantities of which are sent to Europe to be manufactured into chocolate and broma. Population, 37,000.

On the southwest side is Kingstown, at the head of a shallow bay of same name. Population, 6,000. The barracks (empty) and the colonial hospital (closed), are in the northwest part of the town, perched on a hill 650 feet above the sea-level. The general hospital will soon be removed to a new building. The yaws, a form of syphilis with raspberry-like excrescences, is quite

common, affecting the poorest classes of native Caribs, negroes, coolies, and Chinese. Average barometer, 30.17, 4 days; thermometer, 84° Fah.; heavy showers.

The ship steamed out of the harbor of Kingston at 10.15 a. m. March 4, and arrived at Santiago de Cuba the evening of March 8. Distance, 1,005 miles.

Cuba, queen of the Antilles, and Spain's brightest jewel, was discovered by the immortal Columbus in his first voyage westward, in the ever-memorable year 1492. Of the many appellations given to the island by the early discoverers and settlers, the native Indian name, Cuba, has survived them all. Unfortunately, the signification of it is lost in obscurity.

Cuba is volcanic, abrupt, and bold on the southern or Caribbean coast, level and shelving on the northern or Gulf shore; length east and west, 630 miles, seven times more than its greatest breadth north and south, 90 miles.

Santiago or St. Jago de Cuba is pleasantly situated on the eastern side of an elliptical bay, nearly land-locked by spurs of the Cobre (copper) Mountains, three-fourths of a mile long by one-half mile wide and, communicating with the sea by a narrow and tortuous channel two miles long. The mouth of the channel is not over two hundred yards wide and is guarded by a fort or castle 150 feet above sea-level. The town looks well from the bay, backed by the Cobre Mountains stretching away to the east, but a nearer inspection finds the red, yellow, and blue washed houses, with grated windows, sadly out of repair; the hilly streets in a dilapidated condition, full of ruts and holes, while the flagging of the sidewalks, loose and broken, renders walking difficult and dangerous at night.

Santiago has an extensive commerce with the United States; exports, with the addition of tobacco, same as those of all the other islands.

The City Hospital enjoys the reputation of being one of the

best institutions of the kind on the island; is very large and commodious, the four sides enclosing a hollow square. Applications for admission should be addressed to the American consul. Average barometer, 3 days, 30.11; thermometer,  $83\frac{1}{2}^{\circ}$  Fah.; heavy showers. Steamed out of the harbor March 11, and arrived at Havana March 14, via Windward Passage.

At noon to-day, 15th, received the sad intelligence that John E. Leonard, member of the United States House of Representatives from Louisiana, died at the Hotel Telegrafo in this city. The honorable gentleman arrived in Havana about the 2d instant, and had engaged passage to return to New Orleans on the 9th, but was taken sick the same day. His illness resulted in "vomito," yellow fever, which terminated fatally late last night or early this morning. Although no other cases of fever are reported, for prudential reasons, liberty has been stopped and the hospitals in Havana will not be visited.

The city is much frequented during the winter months by phthisical invalids and those of weak lungs on account of the elevation and comparative equability of temperature, conditions well suited to their cases and found only for a short time in the climate of the United States. The mean annual temperature is high,  $78^{\circ}$  Fah.

Night of March 16 received telegraphic orders from Navy Department for ship to proceed to Port Royal, S. C.

Sunday morning, March 17, Powhatan steamed out of the harbor, and arrived at Port Royal, S. C., March 20, having been absent from the United States 53 days.

## U. S. S. CONSTITUTION.

## REPORT OF SURGEON WILLIAM H. JONES.

The Constitution was put in commission January 13, 1877, after undergoing extensive repairs, and was still in an unfinished condition when the officers and crew were transferred on board. She was at once put in condition for the enlistment and training of second-class boys for the naval service, and stationed at Philadelphia, Pa. The ship remained on this duty until December 27, 1877, when all second-class boys were transferred to the United States ship Minnesota at New York, while the ship was fitted out for sea-service.

## HYGIENE.

Daily average number of officers and men .....	203
Total number of cases treated .....	174
Percentage of sickness 0.85; of mortality .....	0
Cubic feet of air-space in clear on berth-deck .....	19,612
Number of men sleeping on berth-deck .....	123
Cubic feet of air-space to each man .....	163
Cubic feet air-space of sick-bay .....	2,972
Cubic feet air-space of each of 4 cells on berth-deck .....	158
Cubic feet air-space of each warrant-officer's room .....	284
Cubic feet air-space of steerage .....	579
Cubic feet air-space of steerage country .....	1,437
Cubic feet air-space of wardroom country .....	4,685
Cubic feet air-space, average, of each state-room .....	308
Occupants of wardroom, officers and servants .....	11
Cubic air-space of cockpit .....	1,565
Cubic air-space of each state-room in cockpit .....	65
Cubic feet air-space in clear on gun-deck .....	26,155
Number of persons sleeping on gun-deck .....	150
Cubic feet air-space to each man .....	174
Cubic feet air-space of lower cabins and state-rooms .....	4,767
Cubic feet air-space of upper cabin .....	1,445
Cubic feet air-space of state-rooms of officers in upper cabin (4) each ..	494
Cubic feet air-space, officers' rooms on spar-deck (2) each .....	288

bay is ventilated by two air-ports, each of  $7\frac{1}{2}$  inches diameter and hatch 9.5 square feet area, and by grating in the bulkhead which separates it from the berth-deck. Ventilation is very defective, especially in bad weather. The berth-deck is ventilated by nine hatches, including those in the wardroom, steerage, and sick-bay, having an area of 130 square feet. There are sixteen air-ports of  $7\frac{1}{2}$  inches diameter distributed from bow to stern, arranged as follows: One to the wardroom, steerage, warrant-officers' rooms, and dispensary; one to the berth-deck, and one in sick-bay, which are available for use in port during pleasant weather.

Windsails are used in summer, and are distributed as follows: One to the wardroom, one to steerage, one aft and one forward to the berth-deck, and one in sick-bay, each windsail having an area of 19 square feet. The remaining hatches leading to the berth-deck are covered by the house on the spar-deck and not available for the use of windsails.

The air between decks became at times very foul and close when all hands were turned in, from the generation of carbonic acid and exhalations from the bodies of the crew, which injured the health of those who slept below, produced derangements of the digestive organs, headaches, and abscesses after trifling wounds or bruises, showing that the food was vitiated and the vital powers lowered as the result of continued exposure to impure air. This effect was especially marked on the second-class boys, who had just enlisted, and on the balance of the crew, who have become habituated to the conditions of ship-life. A change for fresh air took place in the condition and appearance of the second-class boys when they were removed from the berth-deck to the gun-deck, where the ventilation at all times was purer and the air purer. Since then there have been fewer complaints and less illness among the second-class boys.



To show the relative amount of impurity of the air between decks at night, under all circumstances, and at intervals of a few days, I append the result of the observations for ascertaining the amount of carbonic acid per 1,000 volumes, in compliance with the instructions of the circular from the Department, of May 21, 1877. The observations were commenced August 12 and carried on to the end of December. The formula or method used for ascertaining the amount of carbonic acid in the impure air is the one given in Wilson's "Hand-book of Hygiene," page 117, and reprinted on the blanks for "Atmospheric observations."

Observations for temperatures and relative humidity were not commenced until the middle of November, as the wet and dry bulb thermometers were not received until that time. The results of these observations will be forwarded to the Bureau on their proper blanks.

From the observations taken it will be seen that the amount of carbonic acid is largely in excess of what is recognized by all authorities on hygiene as capable of being borne by man for a great length of time without serious injury to health.

I beg to call attention to the fact that corrections for temperature alone were applied until the middle of October; after that time the corrections for temperature and pressure were both applied to the observations. However, as all the data are given in the report, the corrections for pressure can easily be found, if required.

The amount of ventilation between decks was determined by a Cassella's anemometer, which registers the rapidity of the current entering or escaping through any aperture where used, from which the cubic volume is obtained by multiplying the number of feet per minute registered by the area of the aperture. It is next to impossible to get the entering and escaping volumes to correspond, from the constant varying of velocities

s even in the same hatches at a few minutes' intervals are frequently intermittent, variable, or so slight that the argument is not affected by their movement. Passed surgeon E. Z. Derr rendered valuable assistance in working out the observations.

Ventilation on the berth-deck could be very much improved by admitting an increased number of air-ports in the sides of the sick-bay and along the deck proper; and in case this deck is again used for training purposes, I would strongly recommend that two square ports, 18 by 24 inches, be cut in the side to allow a freer circulation of air and the admission of light. The two circular ports in the after part of the ward-room could be enlarged, and a hatch or scuttle cut through the side of the deck to the spar-deck, to give access to light and air in the fore and aft, which at present has no other means of ventilation. The movement caused by the entrance of air in the side of the wardroom.

Ventilation on the gun-deck is ample in fair weather, when the side hatches can be kept open; and even when inclemencies of weather make it necessary to close the hatches and gun-deck, fresh air enters through crevices around the gun-ports and gun-vents, and covers to keep up a circulation. It is only occasionally, when everything is closed and all hands turned in, that the air becomes very impure from the accumulation of carbonic acid, there not being sufficient air stirring to carry off the impurities as rapidly as it is generated. The ventilation in both the upper and lower, is abundant, both being well supplied with fresh air from the ports and hatches.

Ventilation on the deck fore and aft is very dark and gloomy, and the natural light is at all times necessary. This could be improved by putting more air-ports in the ship's sides, in the sick-bay, and along the deck.

Ventilation on the gun-deck is ample for all purposes, even

when hatches and ports are closed, there being two circular dead-lights in every upper half port.

The ship is very efficiently heated in all parts by steam-coils, the steam for which is supplied from a steam-boiler located on the gun-deck.

The water in use on board for the first seven or eight months of the year, was obtained from the water-works that supply Camden, N. J. It was found to be of good quality, containing but a small quantity of organic impurities. It was preserved in iron tanks, and kept well. When this supply was nearly exhausted, examination was repeatedly made of the water alongside where we lay, off League Island navy-yard, to determine its fitness for taking on board for ship's use. It was found to contain an excess of organic matters and other impurities; that it was contaminated by sewage, as shown by the presence of nitrates and ammoniacal salts, and was condemned as unfit for ship's use for drinking purposes. The same water, however, had been in use for several months for cooking purposes, without any ill effects on the health of the crew; any deleterious properties it may have possessed having been destroyed by heat. The difficulty in procuring pure water was finally overcome by utilizing the water obtained from the steam used in heating the ship and condensed in the pipes. This was found to be pure and free from all deleterious agents, and was produced in sufficient quantities to meet all the wants of the ship's company.

The food supplied has been of good quality, abundant in amount, and well prepared. The ship's company have fresh provisions and vegetables three days, and the regular Navy ration four days in the week.

The clothing furnished, as a rule is poor. The articles generally worn are flannel suits for ordinary wear, flannel shirts and cloth trousers on special occasions, and working suits of



During the early part of the year the flannel was of poor quality and not durable, the color very poor, and it changed when worn or washed. This material was condemned and replaced by flannel of good quality which wears well; since then there have been few

complaints of duck furnished for working suits wears well, on account the rough usage it is subjected to by the crew kept constantly at drill or exercise. The cloth is of good quality and so are the caps. Many of the caps were made of cloth drawn from the ship.

Shoes are of poor quality and last but a short time. The soles are too light and should be made of heavier leather; they break from their fastenings to the sole, the side of the shoe from being poorly sewed, or the leather breaks, fresh within a month's wear, and the shoes require repairs. The durability is from three to four month's wear.

When the ship went into commission she was very damp on account of having been exposed to all kinds of weather during the winter, with decks open while undergoing repairs. In transferring the crew, precaution had been taken to dry the clothing as thoroughly as possible, by keeping the steam-heaters running day and night for ten days or two weeks before the crew came aboard. A few cases of sickness resulted from dampness on board, but only two were of a serious nature, one of which was transferred to the hospital; the other recovered on board.

The general health of all on board through the year has been good, no cases of severe illness having occurred; the number of cases on the sick-list being the result of wounds and abrasions occurring among the boys during drill and exercise. Complaints have been comparatively few, taking into account the nature and frequency of the duties on which engaged.

During the year, 493 applicants for admission as second-class boys were examined, of whom 140 were accepted and 353 were rejected for physical defects, or for not reaching the standard required under circular of April 8, 1875, in age, height, or chest-measure. Many who were deficient in the latter, but found otherwise well qualified mentally and physically, were recommended for special order waiving their deficiencies.

I cannot recommend that the standard be lowered, as I have been several times requested to do, but it would save labor on board and at the Department if it were left discretionary with the examining board to waive deficiencies in height and chest-measure whenever the applicant comes within one-eighth or one-quarter of an inch of the standard measure required, and the boy, in their opinion, otherwise physically qualified and particularly well adapted for the service. This would very much facilitate the enlistment of boys, and frequently save parents or guardians, who come from a distance, much trouble and expense in being obliged to wait until a special order is granted, or to make an extra trip to the ship.

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#### U. S. S. NEW HAMPSHIRE.

##### REPORT OF SURGEON JOHN H. CLARK.

I have nothing to add to my report of last year except a few notes concerning an epidemic of yellow fever in Port Royal, S. C., lasting from September 11 to November 8, 1877, when frost appeared. The disease was not definitely diagnosed until October 1, 1877. This epidemic was preceded by an unusual number of cases of malarial fever, but when the epidemic was fully established there was less complication than in those cases which occurred at the same time in Fernandina, Fla., and last year in Savannah, Ga., as is shown by the comparative exemption of negroes and children, and the inefficiency of quinine treatment.

The origin of the epidemic is very obscure, but was probably referable to poison conveyed from Fernandina, Fla., by the City of Dallas, a steamer running between New York City and Fernandina via Port Royal.

Port Royal is situated on a former cotton plantation, nearly surrounded by tidal streams, and noted as a very unhealthy (malarial) place in years past. It is three miles distant from the anchorage of this ship, in an air line, toward the northwest, and four miles from Beaufort, S. C., in a south one-quarter west course. The prevalent winds in October last were northerly and easterly.

While five cases (two fatal) among refugees from Port Royal occurred in Beaufort and several in Augusta and Savannah, Ga., not a case occurred among the residents of either of those cities.

I add the following statistics:

Population of Port Royal, S. C.....	230
First case of yellow fever occurred.....	September 11
Last case of yellow fever occurred.....	November 4
Frost appeared .....	November 8
Total number of cases of yellow fever .....	183
Total number of cases of yellow fever, whites .....	96
Total number of cases of yellow fever, colored .....	87
Deaths, total, including refugees.....	25
Deaths of whites.....	24
Deaths of colored .....	1
Deaths of children .....	3
Deaths of women .....	8

On the appearance of the epidemic (October 1) intercourse between this ship and Port Royal was absolutely cut off, except that fresh beef and vegetables were delivered four times a week at the gangway, and there left by the person bringing them. Communication was kept up daily with Beaufort, and officers and stewards were allowed to visit that place between 10 o'clock a. m. and 4 o'clock p. m.

## U. S. S. ENTERPRISE.

## REPORT OF PASSED ASSISTANT SURGEON MELANCTHON L. RUTH.

The Enterprise, one of the eight sloops ordered by act of Congress of 10th February, 1873, was placed in commission on the 16th of March, 1877, at the Kittery navy-yard, Maine. Owing to deficiency in the appropriation she was not completely fitted for sea until the 11th of August, 1877, the intervening time being spent alongside of the wharf and in the dry-dock.

On the 11th August the ship sailed for Fortress Monroe, where she arrived on the 14th of the same month.

Three months were spent at the Norfolk navy-yard remedying defects in construction, and on the 22d November orders were received for New Orleans. On the 9th December, having stopped at Port Royal and Key West, the anchor was dropped off Canal street.

It will thus be seen that a great portion of the cruise, to this date, has been spent in mild climates, and under the most favorable hygienic circumstances. There has been no exposure to endemic, epidemic, or malarious influences; the health of the people on board has been comparatively good, and the mortality nothing.

The complement of officers and crew is 174. The cubic air-space of each division of the ship and for each person is tabulated as follows:

Division.	Total cubic air-space.	Number of persons.	Cubic air-space per person.	Remarks.
	<i>Feet.</i>		<i>Feet.</i>	
Berth-deck .....	10,322	125	*82.56	*Doubled at sea. Not more than two confined at one time.
Brig .....	270			
Steerage country .....	1,108	8	138.5	
Starboard steerage .....	478	4	119.5	
Port steerage, forward .....	575	2	257.5	
Port steerage, aft .....	331	2	165.5	
Wardroom country .....	2,040	16	127.5	
Wardroom cabins, forward ..	225	1	225	
Wardroom cabins, aft .....	135	1	135	
Cabin country .....	3,427	1	3,427	
Cabin state-rooms .....	400	1	400	

The ventilation of the ship is attempted by means of hatches, air-ports, windsails, and an automatic bilge-pump.

The hatches and air-ports are tabulated as follows:

Division.	Hatches.		Air-ports.		Remarks.
	Number.	Aperture.	Number.	Aperture.	
		<i>Feet.</i>		<i>Foot.</i>	
Berth-deck .....	2	56.6	12	.39	Four scuttles, 18 inches in diameter.
Sick-bay .....	1	8.4	2	.39	
Steerage .....	1	28.1	4	.39	
Wardroom .....	3	48.2	10	.39	
Cabin .....	2	24.2	2	.39	Two gun, two shutter, and two half shutter ports.

The automatic bilge-pump is supposed to perform its purpose at sea when the ship is rolling. As yet it has not demonstrated its ability to carry out the design of its inventor, although it has been afforded ample opportunity.

From the above tabulated statements it will be seen that when the ship is in port, the weather fair and warm, and the majority of the crew on deck, the ventilation is sufficient. When contrary conditions obtain the deficiency is lamentable. At sea, with the air-ports closed, the hatches partially or wholly obstructed by gratings, rigging, and battens, and the windsails inactive, the odors on the berth-deck indicate, only too decidedly, the foul condition of the air. When the windsails are drawing well, and all the hatches and air-ports are open, the atmosphere is not so noisome, but at the best of times our men are **not** given as much air, by half, as is furnished emigrants on crowded ships or convicts in State prisons.

**This** ship is as well ventilated as circumstances will permit. If the government will put too many men into too small a space, it **must** expect its material to degenerate. Where a candle will not burn brightly it is folly to presume that a human machine can be kept in good working order. Were the complement



of this ship filled, as must necessarily be in case of war or sudden emergency, the men would be so crowded that disease would quickly result. To good fortune and strong constitutions is due the immunity from disease which has blessed us.

The sick-bay is situated, as usual, in the forward part of the berth-deck. It is supplied with air-space sufficient for two persons. When more are compelled to swing in it the lack of fresh air is at once apparent.

It is hardly necessary to declaim against the inhumanity of crowding the sick into a limited space in the most disagreeable and the most noisy part of the ship. This subject has been commented on so frequently that ignorance can no longer be given as an excuse. All other civilized nations are accustomed to give their sick the benefit of light, air, and quiet. It seems to be reserved for us to treat them as outcasts and to thrust them into a darkened kennel, where even a healthy man would soon succumb.

The bilges are, at the present writing, sweet and clean.

For months after the ship went into commission, an accumulation of chips, waste, and oil gave origin to such quantities of sulphuretted hydrogen that the after part of the ship was almost uninhabitable. After much labor this relic of the carelessness of the contractor was removed, and since then, by dint of frequent cleansing and a free use of disinfectants, there has been no cause of complaint.

There has not, as yet, been an opportunity of testing the capacity of the steam-heaters. They are well placed, and there is reason to believe that they will be sufficient even in the coldest weather.

There seems to be no good reason why the air-ports should not be larger. An increase of an inch or two in diameter would make much difference in the amount of light admitted, and would enable the berth-deck to redeem itself from its similitude

to a cellar. This being a single-decked ship, the berth-deck is somewhat brighter than is usual, but though brilliant in comparison with others, the berth-deck cooks present the usual "blanched-cabbage" complexion.

The water supplied has been uniformly good. At Portsmouth, N. H., the tanks were filled from the cisterns, and at Norfolk, Va., from the public reservoirs. The condensing apparatus used performs its work well. It could be improved, however, by having attached an aerating machine of better design than the one now used. The water, as now made, is pure, but being insufficiently aerated, has the "boiled wool" taste. The ship can tank 3,300 gallons, a supply for twelve days, full allowance. On account of this limited stowing capacity it has been found necessary to keep the distillers at work almost continuously when water could not be procured from shore. In tropical and semi-tropical latitudes, where it will be advisable to use distilled water at all times, the lack of a small boiler for condensing purposes will be severely felt. Economy suggests that a small boiler would perform the duty more cheaply, and comfort dictates that in the tropics the temperature of the ship should not be unnecessarily raised by huge fires under the main one; but both these monitors appear to be unheeded, and we have the satisfaction of knowing that not only is the ship made hot, but that the water costs from three to four cents a gallon more than it should. An attempt is now being made to utilize the river water. The process is slow, and the water procured, although limpid, is not so palatable as that from the condensers.

The food furnished has been ample in quantity, and, with some few exceptions, good in quality. That furnished from the store-houses in the North was good, but some articles, especially coffee, from the Key West store-house, were not fit for issue. The ration is more than ample; much of it is wasted. If the

quality could be improved at the expense of the quantity much of this waste would be avoided.

Some of the material furnished for clothing has been poor in quality and in dye. The men have naturally complained, for, being compelled to pay good prices, they have also been compelled to receive poor goods. The crew have furnished themselves with working suits of duck, and in many instances with oilskins and rubbers. Great care is taken to have the men properly and warmly clad. In this connection may be noted the fact that most of the men are kept in debt for a long period by the cost of their outfit, which is charged to them. Except as a favor they are not allowed liberty until this debt is extinguished, and, consequently, Jack often finds himself a prisoner to his garments. If legislation would provide a first outfit, free of cost, much cause of complaint would be removed, the service would be more popular, and a great incentive to desertion abolished.

The navy-yard at Portsmouth, N. H., is salubriously situated. It is fortunate that it is so, for the so-called naval hospital at that yard is a poor place for the reception and care of invalids. Being fit for no purpose of the yard it is turned over to the medical authorities for the use of the sick. At the time of the stay of the *Enterprise* it was so dilapidated and so saturated with the seeds of disease that the surgeon in charge thought it more advisable to retain men on board ship than to expose them to new dangers in this disgraceful building.

The Norfolk Hospital is beautifully situated, admirably arranged, and in superb condition, so far as cleanliness is concerned. It is out of repair, but this need can be easily remedied when it is found expedient to prevent the deterioration of public property by the expenditure of a small sum of money.

As the ship has been in New Orleans so short a time, there has been no opportunity of carefully examining the public and



private hospitals of the city, nor of visiting, except casually, the University of Louisiana, claimed to be one of the best medical schools in the South.

The government has a contract with the Hôtel Dieu, a hospital under control of Sisters of Charity, for the care of the sick of the mercantile marine. Our men, if necessity demands, can be placed there at the rate of \$1 a day. The hospital is clean, and every care seems to be taken for the comfort of the patients. No sailors of the Navy are there at present.

The Enterprise is a good sea-boat. She acts well in the severest weather, and is much dryer than others of her class. Under sail she is comfortable. While steaming the engineers' department suffer terribly from heat. During the cruise from Portsmouth to New Orleans the temperature of the fire-room ranged from 95° to 145° Fah., and in the engine room from 90° to 130° Fah. It is stated that proper appliances have not been used to prevent this insufferable condition of affairs. Cases of heat exhaustion have been numerous, and it would be advisable, before the ship again cruises, to have the boilers jacketed or treated in some way, so that the firemen may have a reasonable chance for their lives.

In conclusion, it is pleasant to add that every suggestion from the medical department has been acted upon cheerfully and promptly by the commanding and other officers of the ship. The medical officer has been supported at all times. It is a pleasure to hope that the small sick-list, the lack of mortality, the happy and contented crew, and their splendid physiques are in some measure the result of this rational co-operation between the executive and advisory branches of the service.



SOUTH ATLANTIC STATION.



## SOUTH ATLANTIC STATION.

U. S. S. HARTFORD.

REPORT OF MEDICAL INSPECTOR ALBERT C. GORGAS.

I joined the Hartford on the 26th of last July. She was then undergoing repairs at the navy-yard at Norfolk, Va. She had very few of her crew on board, as most of the men were away, forming part of the naval battalion sent to Washington on the occasion of the railway riots. The battalion returned on the 13th of August, but then the men were sent on board the Franklin, receiving-ship, leaving but ninety men on board the Hartford. This accounts for the very small average sick-list for the third quarter of last year. It was not until October that the whole crew came back to the ship. Many of the men whose terms of service had nearly expired were exchanged for others having longer to serve, so that only about fifty of the old crew were retained.

The average number of people on board since then has been 409. Of this number, 136 sleep on the berth-deck, the cubic contents of which is 27,246 cubic feet, or about 200 cubic feet of air-space to each man. The measurement was taken from the wardroom-bulkhead to that of the sick-bay, including the steerages, but excluding the warrant-officers' cabins, offices, dispensary, etc. There are six hatchways opening into this space and communicating with the upper deck. Windsails are constantly set through three of these whenever the weather permits. It is usually practicable to keep the air-ports open while in port, but at sea, excepting in very tranquil times, it is necessary to keep them closed.

The gun-deck is usually well ventilated, as it is rarely that the gun-ports are required to be closed. At Norfolk the two pivot-guns on the spar-deck were removed and two hatchways were cut, one communicating with the sick-bay and the other with the wardroom. These have greatly improved the lighting and ventilation of those apartments and of the gun-deck. There is a metallic tube between the sick-bay and the spar-deck which assists in ventilating the former, but a windsail set through the newly-cut hatchway is of far more use. The bilges in the after part of the ship are kept free by means of a steam-pump, and there is a "Thiers' automatic ship's ventilator, bilge-pump, and fog-horn," the action of which depends upon the rolling of the ship, and is of course only of use at sea when there is considerable motion of the ship from side to side. At present this apparatus is not in working order; its noise having become intolerable, an attempt was made to correct this defect, and a tube containing quicksilver and metallic balls, being opened, the contents poured out, and thus far it has been found impossible to replace them.

The orlop-deck, and indirectly the shaft-alley, were formerly ventilated by means of a pipe leading up through the wardroom to the spar-deck. This was cut down level with the wardroom deck while we were at Norfolk, thus discharging the gases from below into the apartment occupied by the wardroom officers—an unwholesome and disagreeable arrangement. I am glad to say that this has been corrected by closing the pipe, and by placing two others in the after part of the orlop, which communicate with the propeller-well, and which seem to ventilate the orlop quite as well as the old tube.

Connected with this subject, and indeed in no small degree contributing to the ventilation of the sleeping-quarters of the officers, is a system of "punkas" or fans, one of which is hung in each state-room in the wardroom, and on the berth-deck, and

in each of the steerages, the motion of which is effected by means of an iron rod running fore and aft, and worked by the donkey-engine attached to the bilge-pump.

On the whole the ventilation of this ship is rather better than usual in vessels of her class. In common with the others she has the defect of bilge-ventilators opening from the "skin" of the ship upon the berth-deck and into the cabins of the officers. The seams of the inner planking of the ship are so wide as to discharge a considerable and constant quantity of foul air into these apartments, and the planking itself is in many places so rotten that the possibility of its causing disease is a subject of serious apprehension.

The bilges have been kept clean and dry. The berth-deck, sick-bay, and wardroom are lighted by means of the dead-lights and the hatches already described, and by three opening into the wardroom. The latter is a darker apartment than could be desired for health and comfort, but without a radical change in the arrangement of the gun-deck cabins, it would be impossible to remedy this defect.

The heating of the ship is done with steam pipes, which seem, from their size, to be at least amply sufficient.

While at Norfolk the water from the shore was used for drinking, but since leaving there we have depended entirely upon the distilling apparatus. The water thus made has been generally good, and is now excellent. Defects in the stills, from which the water, on several occasions, became salt, have been remedied, and that now made responds satisfactorily to the tests, and is sweet and good. Its aeration is hastened by its being caused to fall in drops from the height of the spar-deck to the hold, before it is allowed to flow into the tanks. The latter are the usual iron ones and contain a supply for about eighteen days. Water has been freely served out to the crew, and the liberality

shown in this respect has contributed to the healthfulness of the ship in no small degree.

The food has been of good quality, especially the beef, pork, and biscuits.

The adoption of the canvas working-suit has been of great advantage to the men. It saves their blue clothes and enables them to present a better appearance at muster, in boats, and on dress occasions, at a diminished expense. It has become the fashion to cut the men's frocks so as to fit nearly close to the body, by which the garment loses much in gracefulness, and which detracts from comfort and the ease necessary to work well aloft. The flannel underclothing is too heavy. It thickens in the armpits and in the fork of the thighs, with the perspiration, and is so difficult to take off that it seriously interferes with regular habits of cleanliness, for indifferent men, or those pressed for time, will postpone bathing until the last possible day, rather than go through with the prolonged skinning process necessary to get rid of their adhesive garments. Most of the men draw lighter flannel and make their own underclothes.

Since leaving Norfolk, six days were spent at the island of Madeira, and six anchored off the harbor of Rio de Janeiro, Brazil, the rest of the time at sea. At Madeira general liberty was given; but one case of venereal disease was contracted there.

News of the presence of yellow fever at Rio induced the commodore to anchor outside of that harbor, and in order to verify the reports received at Madeira, we communicated with the island and fort of Santa Cruz at the entrance. The reports were there confirmed, although the disease, it appeared, was not epidemic or severe.

I give below the total daily deaths (interments) at Rio de Janeiro, and those from yellow fever, for the months of November and December. It will be seen that the latter disease increases as the hot season advances.



## NOVEMBER.

Days.	Number of interments (of all diseases).	Number of interments of yellow fever.	Days.	Number of interments (of all diseases).	Number of interments of yellow fever.
November 1.....	22	0	November 16.....	26	0
2.....	23	0	17.....	24	0
3.....	27	1	18.....	26	1
4.....	21	0	19.....	23	1
5.....	20	0	20.....	33	1
6.....	24	1	21.....	21	0
7.....	31	0	22.....	20	0
8.....	20	1	23.....	22	1
9.....	30	2	24.....	23	1
10.....	24	0	25.....	25	0
11.....	26	0	26.....	30	1
12.....	29	1	27.....	24	1
13.....	23	0	28.....	16	0
14.....	34	1	29.....	20	0
15.....	23	1	30.....	38	2

## DECEMBER.

December 1.....	39	5	December 17.....	35	0
2.....	27	1	18.....	48	2
3.....	26	4	19.....	34	2
4.....	33	2	20.....	27	3
5.....	30	3	21.....	36	3
6.....	24	0	22.....	23	3
7.....	24	0	23.....	32	1
8.....	22	0	24.....	21	3
9.....	27	0	25.....	27	1
10.....	34	3	26.....	50	3
11.....	20	0	27.....	29	2
12.....	23	0	28.....	22	1
13.....	33	1	29.....	36	1
14.....	29	0	30.....	19	3
15.....	30	0	31.....	43	4
16.....	38	2			

Of the 53 deaths from yellow fever during the month of December, 49 were foreigners.

The ship did not enter the harbor of Rio de Janeiro, but after receiving the mail on board left the outside anchorage and proceeded to Montevideo, where she did not arrive, however, until the 2d of January, 1878.

Recurring to the subject of ventilation, I would add that while the ship was at the Norfolk navy-yard it was necessary to discontinue the pumping out of the bilges. Very soon the

foulness arising from below became insupportable, and upon examination, the bilges below the magazine and shell-room aft were found to contain a mass of coal-dust, oil, and sea-water, forming a mixture from which the stench was horrible. It was recommended by my predecessor, Dr. Dean, and the commanding officer, that scuttles should be cut through the floors of the magazine and shell-room, so that this accumulation might be removed as it collected in the future, but the plan was disapproved by the Chief of the Bureau of Construction and Repair, and a bulkhead placed across the bilge instead. No opportunity of testing the effect of this has been had since.

The average sick-list for the fourth quarter 1877 was  $10\frac{3}{2}\%$ , or about  $2\frac{3}{4}$  per centum. There were no deaths during the quarter. The greatest number sick on any one day was 18. This occurred twice, viz, on the 18th and 21st of October. For several days previous the weather had been bad, and a heavy sea was running, and the ship rolled so deeply, that, from the water entering through the port-holes, her gun-deck was almost constantly flooded. And, notwithstanding the recent calking of this deck, the water leaked through to the berth-deck, and into the sleeping-rooms below. The ports fit the guns illy, and there are no grommets to close the open spaces around the guns, and the attempt to improvise grommets of rope was a failure. Had the ship been provided with rubber grommets much discomfort and sickness would have been prevented.

The principal cause of disease, as the sick-report shows, has been malaria, to which we were exposed at Norfolk. Although but one case of neuralgia is entered upon the sick-report, there has been a good deal of it intercurrent with other diseases, but not sufficiently serious to place the sufferers upon the excused list. The number of intermittent and remittent fever cases has greatly diminished of late.

I have had no opportunity of communicating with the Essex,

the only other vessel now belonging to this station, and this report is necessarily entirely based upon the conditions affecting this ship alone.

I would say in conclusion that the crew, although young, are generally of good physical development, and seem cheerful and contented. They are clean in their persons, and pay unusual attention to the condition of their bedding and wearing apparel.

I inclose with this the atmospheric observations for the month of December, mistakes and irregularities in noting the meteorological facts rendering those of October and November unreliable.

Upon joining the ship I recommended that the berth-deck should be lacquered. This was received favorably, but circumstances have hitherto interfered with the work, but preparations are now making to cover the deck with a solution of shellac.

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EUROPEAN STATION.



## EUROPEAN STATION.

### U. S. FLAG-SHIP TRENTON.

REPORT OF PASSED ASSISTANT SURGEON J. W. ROSS.

*Hygiene.*—Complement of officers and men, 478; actual number on board, 445-476.

Cubic air-space of gun-deck, 56,500 feet; number of men sleeping on this deck, 325; cubic air-space for each man, 174 feet; of berth-deck, 23,500 feet; number of men, 111; cubic air-space for each man, 202 feet; of forward-officers' rooms, 280 feet; of each steerage, 1,075 feet; number of officers' in steerages, 18; cubic air-space for each steerage officer, 119½ feet; of wardroom, 14,000 feet; of wardroom country, 8,960 feet; average of each wardroom state-room, 280 feet; occupants of wardroom, 18 officers; cubic air-space for each, 778 feet; of gun-deck cabins, which freely communicate, and may be considered as one, 6,100 feet; occupants of cabins, 2; cubic air-space of each, 3,050 feet.

Percentage of sickness, 71.54+ of complement; of mortality, 0.87+ of admissions; 0.63+ of complement. There were three deaths: one from falling overboard and drowning; one from drenching in a cold rain, having had before joining the ship grave and incurable lesions of the heart and lungs; and one who shortly before this ship went into commission was pronounced by the surgeon of the Colorado to have serious valvular disease.

Except in bad weather at sea, the gun-deck is almost always well supplied with fresh air during the day through the numerous hatches, the five small circular ports 8½ inches in diameter, and seven large square gun-ports on each side. At night, with the ports closed and the hammocks of both watches slung, the

air is always close and impure. At sea lashing and carrying is rigidly enforced except in wet weather, when the watch going on deck is allowed to leave its hammocks lashed below. No man is allowed to sleep in another man's hammock. Communicating directly with the open air, through the spar-deck, are nine hatches, a skylight, and a scuttle. This surface is not all available for the purpose of ventilation; five of the hatches are partially occupied by ladders, and the fire-room hatch is almost entirely closed in by two launches and spare spars.

The cubic air-space for each man has been stated to be 174 feet, but in reality this should be considerably reduced. Estimating the space occupied by each of the eight carriages and guns at 50 cubic feet, by each individual at 3 cubic feet, and that by each hammock at 2 cubic feet, each person will have  $167\frac{2}{3}$  cubic feet of air-space, which is still too large an estimate, as the space abaft the wardroom-hatch is set apart for the officers' use and is not available for the men. The head and two cells on the forward part of this deck will be noticed elsewhere.

The two gun-deck cabins, in this report considered as one, together with the two offices attached, are excellently ventilated by means of six circular dead-lights, four large square ports, and four smaller square ports in the quarter galleries, and two small circular skylights opening on the spar-deck. The cubic air-space for each occupant is 3,050 feet, the servants not being included, as they do not sleep in the apartment. The wardroom is occupied by 18 officers and 9 servants, the latter not entering into the estimate of the cubic space for each person, as they occupy it only during the day, when everything is generally open and the freest circulation allowed. Each state-room with the exception of three is provided with an air-port about five feet above the water-line, which can be kept constantly open in port and in fair weather at sea, and communicates with the country by a door and bulkhead open at the upper portion, as



are all the inboard partitions on the berth-deck. The first room on each side has an entire air-port and shares a second with the second room, this, as well as the fourth and fifth rooms, having only half an air-port each. Two doors and the partly pervious bulkheads open forward into the steerage country, and through it to the open space of the berth-deck, thus allowing a free fore-and-aft current the whole length of the ship. The pantry is provided with two smaller ventilators opening aft, and the country communicates directly with the open air by means of a large square shaft, covered with a skylight, and two hatches in its forward portion, both opening on the gun-deck, and indirectly on the spar-deck, the front one unprovided with a skylight, and occupied by ladders. By means of these sixteen air-ports, hatch and forward communications, aided, when necessary, by two windsails, the wardroom is generally well and effectively ventilated.

It may be proper in this connection to state that when this vessel was placed in commission, through some mistake of construction, free communication between the berth-deck and gun-deck with the bilges existed, an error which, but for the earnest endeavors of the medical officers against prejudiced opposition, would have been fruitful in deleterious consequences. These bilge-vents are now insecurely closed, the material used for their closure having shrunk, and from the working of the timbers at sea. Perfect immunity from the danger to which such construction exposes the officers and crew can be only secured by forbidding such faulty workmanship, and making these apertures communicate directly with the open air. During the first six months of the cruise some mechanical obstruction prevented access to the bilge beneath the starboard after magazine, where putrescent water accumulated, and the most fetid gases escaped. This obstacle has since been successfully removed, and it is a noteworthy fact that while this condition

existed the occupants of the starboard wardroom state-rooms suffered far more from sickness, generally ill-defined, marked by lassitude, gastric and intestinal derangement, headache, and various obscure malaria-like symptoms, than did their neighbors of the opposite side; this discrepancy was no longer observed when the matter was remedied.

In the steerages the cubic air-space for each officer is by far too small, and the quarters are unnecessarily crowded. Ventilation is very imperfectly effected by two circular air-ports, the doorway, and the adjacent hatch, aided, when it is thought necessary, by a windsail, but these means are inadequate to secure the frequent change of the limited air, which has a constant tendency to stagnate. When it is considered that 2,150 cubic feet of space is to be divided among 18, diminished by the clothing of the occupants, and without appliances for a rapid renewal of the air, it is obvious that the sanitary condition of this part of the ship is very unsatisfactory. Since it is impossible to obtain more room, no remedy suggests itself, except that the number of steerage officers should be reduced to the minimum number actually needed.

The after orlop-deck is ventilated by means of a large hatch opening into the steerage country.

The cubic air-space on the berth-deck for each man, stated to be 202 feet, is really not so great when reduction for the space occupied by 111 men, with their hammocks, the bags and mess-chests, and the anchor-engine, is made. Ventilation here is secured by the engine and fire room hatches, three forward hatches and a scuttle, four oval hawse-pipes and five air-ports, aided occasionally by two windsails. It is frequently very defective, and in the summer time, under steam, without wind, the air is almost stifling. The hawse-pipes have not proved a source of annoyance by keeping the deck wet, and are of great value in the ventilation of this deck, allowing, when open, in

port and at sea, with any wind, a fine current to sweep along the whole length of the deck and expel the foul air through the after hatches. The unfortunate necessity of taking up so much of this deck with coal-bunkers is greatly to be deprecated, and has crowded what would otherwise be a comparatively commodious and abundant space. The absolute need of securing better ventilation for our vessels of war, by which the government would save greatly in a diminished expenditure and an increased efficiency of the men, should more seriously engage the attention of our naval architects, and since it is almost impossible to give an abundant breathing space, the defect should be remedied as far as possible by having the complement of our vessels no larger than the actual working of the ship's guns and manipulation of the ship demand. In this measure, doubtless, lies one of the chief methods of carrying out the principles of advanced hygiene and sanitary reform.

When the apertures, mentioned under ventilation, are unobstructed, the gun-deck and cabins, as well as the wardroom country, are fairly lighted during the day. On the whole of the berth-deck, which, by the way, is probably better lighted than any other in the Navy, in the officers' state-rooms, and the steerages artificial light is nearly always required. The air-ports here should be greatly increased in number and size.

The warming of the ship is effected by means of steam coils or radiators, placed as follows: Two in the cabins, one in each office attached, two in the wardroom country, two opposite the engine-room bulkhead on berth-deck at some distance from the steerages, one in each sick-bay, and both forward and aft of each sick-bay an additional one. This arrangement and distribution of the steam-pipes serves its purpose tolerably well, but might be modified with benefit. The steerages, for example, are so far removed from the only available heater, and are so related to the adjacent hatches, that they are insufficiently

warmed in cold weather; and comfort demands the closing of the air-ports or doors, thus imprisoning the warm but vitiated air. A small heater should certainly have been placed in each steerage. The gun-deck during the winter season in a cold climate would be more habitable and much healthier if a sufficient number of these radiators, say three large ones on each side, properly distributed, were placed upon it; their absence is doubtless a serious sanitary defect. Being the deck upon which the majority of the crew is billeted, the air, to be kept below the limit of very injurious impurity, needs to be very frequently renewed. This, when the temperature is low, can only be done at present by exposing the men to intense discomfort from cold and serious danger from strong draughts, especially dangerous at night. The warm, already used air rising from the deck below, aided by the heat from the galleys and the warm currents from the fire-room, insufficiently heat the deck, and, in consequence, the gun and air ports are closed, the hatches carefully covered with hoods, everything being made as nearly air-tight as possible, unless the objection of a medical officer is interposed.

The presence of heaters would obviate the necessity for so carefully shutting in the impure air and shutting out the outer pure air, secure better ventilation, and at the same time prevent the slow drying of the deck after being flooded on holystoning days, and contribute to the reduction of the percentage of acute inflammatory and rheumatic attacks.

The water used on board has been, for drinking and cooking, almost entirely that obtained from condensation of steam, aerated and purified by the patent apparatus of Passed Assistant Engineer Baird, U. S. N. The condenser supplies, at an average cost of  $1\frac{3}{4}$  cents per gallon, about 3,000 gallons of water in twenty-four hours, but this estimate is probably exaggerated. This water yields very slight evidence of the presence

of saline substances, and is generally quite free from any impurity. It is run into the tanks at a temperature of  $85^{\circ}$  to  $90^{\circ}$  Fah., and occasionally has a disagreeable, nauseous taste, which disappears in a day or two. This taste is due, no doubt, to insufficient oxygenation and to a trace of the oil used on the machinery, and might easily be remedied, so that the water would be cool and potable when received into the tanks. The coils in the condenser should be more numerous, and instead of a filterer two feet in diameter, with a depth of two feet of animal carbon, rarely changed, and cleansed only by washing, a larger one should be used; the layer of animal charcoal should be deeper, cleaned by washing and heating to a red heat every month, and covered by a layer of clean, coarse sand several inches thick, which could be easily renewed.

The fresh water along the Mediterranean coast is notoriously bad, from organic and saline contaminations, and generally medical officers decline to receive it on board. On vessels where the water from shore has been most used, the occurrence of diarrhoea and gastro-intestinal derangement, has shown its injurious effects. The disposition of the commanding officer to receive the water from shore is justified by its cheapness, as it costs but three-quarters of a cent per gallon.

The allowance of water, which is not rigidly adhered to, is 700 gallons per diem, less than two gallons per man, an amount entirely too small, as the supply can be constant and need not be so limited. This insufficient supply of water compels the men to use salt water, if any be used, for cleansing their bodies, which is disagreeable. The ship carries 13 iron tanks, with an aggregate capacity of 14,401 gallons, and 13 water-casks, with an aggregate capacity of 505 gallons, making 14,906 gallons, which, with an issue of 600 gallons a day, is a water-supply for about 25 days. In the examination of water from shore the means for the detection of hardness, suspended and dissolved

organic matter, with especial inquiry as to its origin, are most relied on. No suspicious water is ever received on board.

A considerable item of expense would be spared the men if the amount of fresh bread issued to each man was increased about one-third. With this change the quantity of food furnished would be ample; it has always been of excellent quality and sufficient variety.

Men on board ship are inclined to drink too largely of strong coffee. Aboard the Trenton several cases of functional heart derangements and obscure nervous troubles, and three cases of gastro-intestinal catarrh with jaundice, have been pretty clearly traced to this cause. The men have been, in consequence, compelled to use tea at least once a day, with good results. The ship has passed a large portion of her time in port, and the men have been freely supplied with fresh meat and vegetables. The contents of the bumboats are in every port carefully inspected by a medical officer.

The clothing furnished to the men has been usually that supplied from the paymaster's stores, as prescribed by the naval regulations, and has been of good quality. Frequent permission, when desired, has been given them by the commanding officer to purchase various articles of their uniform, on shore, with a decided pecuniary saving, woollens being so much cheaper in Europe than America. No change from the present dress is suggested, the white in summer and the dark blue in winter being well suited for the climate in the Mediterranean, and very comfortable to the wearers.

The expense of obtaining their outfits and the difficulty of working off the debt necessarily contracted at the beginning of a cruise, prevent a large proportion of the men from supplying themselves with warm monkey-jackets, which are absolutely needed in cold weather and generally at night when at sea. A good warm coat of beaver or pilot cloth should be made a neces-

sary part of an enlisted man's outfit, and it should be as much the duty of a division officer to see that his men are supplied with them as it is for him to see that they are supplied with a mustering suit. Each man should also be compelled to provide himself with a complete suit of water-proof clothing of the best quality to protect him from the frequent rain to which he is unavoidably exposed on deck, aloft, and in boats. Such a suit would last a long time, and is not very expensive. The other clothing, as well as its owner, being kept dry, would last much longer, and at the end of the cruise the man would be in better health and have spent no more money for clothing than if he had dispensed with his water-proofs. It is a subject of surprise that blue-jackets are not supplied with the outfit of clothing upon enlistment, as in the Army and Marine Corps. It would prevent much thieving on board ship, save the men considerable expense, and enable them to make a much more creditable appearance if they each had a small locker for preserving clothing, etc.

*Bilges.*—Very little discomfort has been experienced from this source since the defect noted has been remedied. They are each week thoroughly washed, whitewashed, and disinfected by the use of sulphate of iron. By these means, together with daily morning and evening pumping out, they are kept quite clean and almost harmless.

*Sick-bays.*—The good results of the medical crusade against the custom of placing the hospital of our men-of-war in the most uncomfortable part of the ship are shown by the superior position and greater facilities for the treatment of the sick which have been secured on this vessel. On each side of the berth-deck, about one-third nearer its forward than its after end, near two hatches, a liberal allowance of space has been given up to the accommodation of the sick, which, fairly lighted, well warmed in cold weather, and tolerably well ventilated,

presents many points of superiority over the ordinary sick-bays of our Navy. The cubic capacity of each sick-bay is 1,325 feet, and ventilation is effected by means of three small circular air-ports, two doors with the intervening inboard bulkhead, open above, aided by a windsail when needed. Communicating with the forward end of each is a small, well-arranged water-closet, provided with an air-port. A serious need is felt for bathing facilities for the patients, and it would have been far better if one of the water-closets had been sacrificed, and its place supplied by a bathing-tub with steam-pipes communicating. The cots used are the usual clumsy wooden ones, which occupy an unnecessarily large space, and for which light iron ones, provided with a wire mattress, could advantageously be substituted. The quarters for the sick of this vessel are unusually comfortable, and sufficiently roomy, under ordinary circumstances, for the swinging of all hammocks and cots needed. True, its situation exposes patients to the disturbances of the forward part of the ship, the noise from the working of the anchor-engine, chains, etc. In serious cases, however, the quiet and superior comforts of a curtained apartment on the gun-deck have been easily obtained.

The dispensary is small, and is separated from the after part of the port sick-bay by an impervious bulkhead. It would be an improvement if this space was increased so that the dispensary could serve the purpose of a pharmacy, and allow a private place for the examination of certain patients, and for writing the journal, returns, and certificates. If this increase of space could be obtained, a doorway permitting direct communication with the sick-bay would be a decided convenience and improvement.

*Fire-room.*—This part of the ship is generally airy and comfortable, but under steam in warm weather the temperature is high. During the run from Smyrna to Villefranche, in the



latter part of August last, it remained constantly between 140° and 150° Fah., the temperature on deck ranging from 79° to 86° Fah. The firemen, during this run, stood very short watches, were freely supplied with small doses of brandy, and no immediate injurious results were observed. To the sudden change of temperature from the fire-room to the open air, and *vice versa*, is apparently due the large proportion of heart diseases, rheumatic affections, etc., occurring among the firemen and coal-heavers.

*Cells.*—These, two in number, were built recently, and are situated one on each side of the gun-deck, just abaft the officers' water-closets. They have each an area of 160 cubic feet, have each a circular air-port about 15 feet above the water-line, and a small iron-grated window. Several small openings will shortly be made near the deck for allowing heavy foul gases to escape, after which the cells will be almost unobjectionable.

*Heads.*—These occupy the extreme forward end of the gun-deck, are two in number, one on each side, and enclosed, except at their forward end, by a latticed bulkhead. At present only one of them, provided with four seats, is available for the men, the other one being used for emptying the slops, etc. These four seats are manifestly insufficient for the 400 men who are compelled to use them. A man is often compelled to wait as much as an hour for his turn. Considerable suffering and uncleanness, as well as a tendency to hæmorrhoids and constipation, have resulted. Both heads should certainly be used by the men, and there should be at least five seats in each, there being ample room. The slops could easily be emptied through the two large buckler-holes, which exist one in front of each head.

*Vaccination.*—A report has already been made by me of certain facts showing the danger of relying upon the crusts furnished by the United States Naval Laboratory. The subject is of such importance that I feel justified in again calling

attention to it. The first vaccination on board this ship was done with bovine crusts provided by the laboratory. There were 411 vaccinations, only 7 of them being successful, about 1 in 59. The second vaccination was done with lymph from the arms of human beings, put up in London, England, in capillary glass tubes. There were 453 vaccinations, 157 of them being successful, about 1 in 3. The two vaccinations were performed upon the same men, by the same medical officers, in as nearly as possible the same manner, and during the same year, the only difference being that in one case crusts from the cow were used, and in the other lymph from the human being. I would also state that a private of marines, unsuccessfully vaccinated with the bovine crusts and not vaccinated with the humanized lymph, had an aggravated case of confluent small-pox at Smyrna last summer. The men have been much more exposed to small-pox since than before the vaccination with the lymph, but no other case has occurred among them.

*Bayman.*—There are certain objections to making this position a permanent one. The confinement between decks, loss of sleep, etc., if long continued, must, in spite of every precaution, affect the health injuriously. Since the cruise of the Trenton began, one bayman has been invalided with pulmonary phthisis, and a landsman, who took his place in the sick-bay, became in a few months so anæmic that he was returned to the deck. If the present arrangement is continued, the pay of baymen should certainly be increased and some provision made for their advancement similar to that of the men on deck.

*Climatology.*—The Trenton is kept unusually dry between decks. The gun-deck and that portion of the berth-deck occupied by the chains and anchor-engine, are holy-stoned about once a week, and dry quickly. The remaining portion of the berth-deck, coated with shellac, is swabbed down twice a week with fresh water.

A large proportion of the diethetic, respiratory, and locomotive diseases which have occurred on board have been traceable to the cold wet weather which prevailed during our stay at New York. Since leaving that place we have had pleasant, healthful weather, except in July and August, at Smyrna, where the thermometer showed a steady temperature of about 83° Fah. This warm weather seems to have had very little effect upon the health of the ship.

Annexed is a tabulated statement of the diseases and injuries which have occurred on board during the year.

*Medical topography.*—The United States ship Trenton, second-rate, 2,300 tons, intended as flag-ship of the European Station, was put into commission at the navy-yard, New York, February 14, 1877. Her officers and crew were received on board the 24th day of the same month.

Below is a tabular statement of the places visited by her up to January 1, 1878, giving dates of arrival and departure.

*List of ports visited by the Trenton during the year 1878.*

Name of port.	Date of entry.	Date of departure.
New York .....	March 29, 1877	March 10, 1877.
Lisbon .....	April 12, 1877	April 10, 1877.
Gibraltar .....	April 18, 1877	April 15, 1877.
Villefranche, France .....	May 15, 1877	May 9, 1877.
Smyrna, Turkey .....	June 10, 1877	June 9, 1877.
Salonica, Turkey .....	June 14, 1877	June 13, 1877.
Smyrna, Turkey .....	July 28, 1877	July 28, 1877.
Mitylene, Turkey .....	July 30, 1877	July 29, 1877.
Smyrna, Turkey .....	August 6, 1877	August 5, 1877.
Scio, Turkey .....	August 7, 1877	August 7, 1877.
Lidgia, Turkey .....	August 9, 1877	August 9, 1877.
Smyrna, Turkey .....	August 30, 1877	August 25, 1877.
Villefranche, France .....	September 5, 1877	September 4, 1877.
Marseilles, France .....	October 18, 1877	October 18, 1877.
Villefranche, France .....	January 1, 1878	December 26, 1877.
Smyrna, Turkey .....		

So much has been written by medical men about Lisbon, Gibraltar, and Nice, of which Villefranche is only a seaport, that little or nothing remains to be said.

In all Turkish ports the bill of health must be carried ashore  
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and pratique obtained at the health office. In the other countries visited by us the health officers come on board.

Appended is a list of questions required to be answered in writing by the commanders of all vessels arriving at Gibraltar.

For about a week before the Trenton went into commission, her men were much exposed to cold and wet while at work on and around the ship, coaling, provisioning, etc. For a day or two it was impossible to dry or warm themselves, as there were no arrangements for warming the gun and berth decks, closing the gun-ports or covering the hatches. In consequence several came immediately to the sick-bay, seriously sick, and quite a number of others soon followed their example. An attempt was made to send the graver cases to the hospital, but want of time and the commandant's fear of "depopulating the ship" made it impracticable to do so. Five of them were, however, gotten rid of before sailing. Among the first patients was a boy with an infectious disease, mumps. His hospital ticket was made out and an unsuccessful attempt made to send him ashore. Nearly two weeks later a second case of the disease showed itself, and in the course of ten weeks about 30 others occurred. The fact that this second case showed itself nearly two weeks after the patient came aboard, justifies the belief that if the first case had been promptly gotten out of the ship the epidemic would not have followed. The only points of interest in this epidemic are, that there existed a decided adynamic tendency, ascribed to the previous hardships undergone by the patients, requiring pretty free stimulating and feeding, and that in two of the cases metastasis to the testicle occurred.

The effects of the severe exposure at New York are still plainly to be seen on board, and has cost no small sum in the way of sending invalids home, cod-liver oil, brandy, quinine, and provisions for the sick. Except in very urgent cases no

men-of-war should ever be fitted out in any of our North Atlantic ports during the winter.

*Marseilles*, the principal seaport of France, and capital of the department of the Bouches-du-Rhône, is situated on the northeast shore of the Gulf of Lyons, in latitude  $43^{\circ} 18'$  north, longitude  $5^{\circ} 22'$  east. It is an animated, handsome, and prosperous manufacturing city, in active commerce with most parts of the world, especially Algeria, the Levant and other coasts of the Mediterranean. It possesses commodious and sheltered harbors, an old and new port embracing several basins, and has a water area of 200 acres for the thousands of vessels entering and clearing annually. The population is about 315,000, and presents on its busy quays and wide streets a fair sprinkling of foreigners from nearly every climate. Its situation is picturesque and beautiful, in the centre of a sloping amphitheatre, the surrounding hills forming the suburbs being thickly clad with houses, villas, and vineyards. Unprotected on the north by elevated mountains, its winters are colder than in other French, Spanish, and Italian places of nearly the same latitude, and it is frequently subject to the strong, cold "mistral," "the scourge of Provence." Among the public institutions, none of which present many points of architectural interest, are the École de Médecine, Hôtel Dieu, Hôpital de la Conception, Maternité, Hôpital Militaire, a lunatic asylum, an alms-house, and several other public and private charities.

École de Médecine.—This medical school has an annual average of two hundred and fifty students and is reputed to teach thoroughly the rudiments of medicine. Its charter does not allow it to confer the degree of Doctor of Medicine, but only that of "Officier de Santé," and most of its students go either to Lyons or Paris to obtain their degrees. An "Officier de Santé," about fifteen being sent out annually, is not allowed the privilege of performing important surgical operations, and generally finds his home in the rural districts.

Hôtel Dieu.—This hospital is an old and patched-up structure lacking many of the important details of a modern building, and deserves only a passing notice. Containing two hundred and sixty beds, it has a daily average of about two hundred and fifty patients. The subsistence for each patient is estimated at  $21\frac{1}{2}$  cents per diem.

Hôpital de la Conception.—This is a comparatively modern structure erected in 1853, somewhat on the pavilion system, being made up of numerous wings radiating from a large common and central court. It has beds for six hundred, and generally has in it about five hundred and fifty patients. Among its inmates a few sailors are generally to be found, but the French sailors, whenever possible, are sent to the Naval Hospital in the neighboring city, Toulon. The cost of subsistence for each patient is estimated at  $17\frac{1}{2}$  cents per diem. The practice of continental medical men in their management of diseases is so well known that reference to it is superfluous and unnecessary.

Maternité.—This lying-in hospital, really a part of the institution just named, of similar construction, cost of subsistence, etc., has accommodations for one hundred and twelve, and generally contains about eighty-six patients.

Hôpital Militaire.—This building for the military branch of the public service is large, clumsy, and built around a central court-yard. It is about forty years old and has a capacity of six hundred beds, of which an average of one hundred and seventy-five are occupied. Sufficient time and opportunity for obtaining much information concerning the arrangement of the hospitals named and data relating to ventilation were wanting.

Lunatic asylum and alms-house.—The former has accommodations for twelve hundred, and the latter for six hundred persons; neither deserves any extended notice. The cost of subsistence of each patient in the alms-house is estimated at  $13\frac{1}{2}$  cents per diem.

*Tabular statement of diseases and injuries on board the United States ship  
Trenton, from February 24, 1877, to January 1, 1878.*

Diseases.	First quarter.				Second quarter.				Third quarter.				Fourth quarter.				Total.				
	Admitted.	Discharged.	Transferred.	Died.	Continued to next quarter.	Admitted.	Discharged.	Transferred.	Died.	Continued to next quarter.	Admitted.	Discharged.	Transferred.	Died.	Continued to next quarter.	Admitted.		Discharged.	Transferred.	Died.	Continued to next quarter.
CLASS I.																					
Order I:																					
Cynanche parotidea.....	15	13			2	2	7	9												22	
Erysipelas.....	1	1																		1	
Febris continua simplex.....						2	2									1	1			3	
Febris enterica.....						1	1													1	
Febris intermittens.....	4	4				6	6				1	1				1	1			12	
Variola.....											1	1								1	
Vaccinia.....											1	1								1	
Order II:																					
Syphilis primitiva.....						2	2									5	3		2	7	
Syphilis consecutiva.....						5	3			2	2		2	2			2			5	
Gonorrhœa.....	1	1				1	1				6	5		1	1	4	4		1	12	
Order III:																					
Alcoholismus.....						2	2				1	1								3	
CLASS II.																					
Order I:																					
Adynamia.....	3	3				4	3			1	1	2	2		1	1	3	3	1	12	
Rheumatismus acutus.....	5	4			1	1	2	3									3	3		10	
Rheumatismus chronicus.....	3	2	1			4	4										5	5		12	
CLASS IV.																					
Order I:																					
Cephalalgia.....	1	1																		1	
Insolatio.....						1				1	1									1	
Neuralgia.....	3	3				2	1			1	1	1	2			1	1			7	
Aphasia.....											1	1								1	
Insanitas.....											1		1	1			1			1	
Order II:																					
Amaurosis.....											1	1								1	
Cataracta.....																1	1			1	
Conjunctivitis.....	1				1	1	1	2			1	1								3	
Iritis.....																1	1			1	
Keratitis.....						1	1				1	1								2	
Order V:																					
Aneurysma.....						1				1	1	1		1	1	1				1	
Morbi valvularum cordis.....						3		1	1	1	1		1			1	1			4	
Syncope.....						1	1													1	
Order VI:																					
Asthma.....						1				1										1	
Bronchitis acuta.....	5	4	1			1	1				3	2		1	1		1			9	
Bronchitis chronica.....						1	1									2	1			3	
Catarrhus.....	1				1	1	1	2								1	1			3	
Phthisis pneumonica.....											2		1	1	1	1		2		3	
chronica.....																					
Pleuritis.....						3	3				1	1				1	1			5	
Hæmoptysis.....																1	1			1	

*Diseases and injuries on board the United States ship Trenton, &c.—Continued.*

Diseases.	First quarter.				Second quarter.				Third quarter.				Fourth quarter.				Total.
	Admitted.	Discharged.	Transferred.	Died.	Continued to next quarter.	Remaining from last quarter.	Admitted.	Discharged.	Transferred.	Died.	Continued to next quarter.	Remaining from last quarter.	Admitted.	Discharged.	Transferred.	Died.	
CLASS IV.—Continued.																	
Order VII:																	
Cholera morbus.....							1	1					3	3			7
Colica.....							3	3					1	1			4
Constipatio.....	1	1															1
Diarrhoea acuta.....	1	1					4	4					4	4		1	10
Dys-pepsia.....													1	1			2
Icterus.....	1	1											1	1			2
Hæmorrhoids.....																1	1
Pharyngitis.....	1	1											1	1		1	3
Tonsillitis.....	1	1					1	1					1	1		1	4
Order VIII:																	
Albuminuria.....	1	1															1
Ophthalmia.....	2	1			1	1	1	1			1	1	1	2	2	1	7
Urethrae strictura.....							1	1									1
Epididymitis.....																1	1
Order X:																	
Abcessus.....							3	3					7	7		4	14
Adenitis.....							3	3									3
Furunculus.....							3	3					8	8		7	18
Herpes.....							1	1					1	1			2
Paronychia.....	1				1	1	5	6			2	2				6	14
Ulcus.....							3	3									3
Urticaria.....							1	1									1
Cellulitis.....													1	1			1
CLASS V.																	
Osteoma.....													1	1			1
CLASS VI.																	
Order I:																	
Abrasio.....							2	1			1	1	1	2			3
Ambustio.....							1	1			1	1		1			1
Contusio cerebri.....							1	1									1
Contusio.....	7	4			3	3	9	12					6	6			24
Fractura.....	1	1			1	1	1	2					2	1		1	4
Stemma.....	6	4	1		1	1	5	6					4	4		5	20
Submersio.....	1				1												1
Vulnus confusum.....	3	3					6	6					1	1		4	14
Vulnus incisum.....	2				2	2	1	3					2	2		1	6
Vulnus laceratum.....							3	2			1	1	5	6		4	12
Vulnus punctum.....							1	1									1
Vulnus sclopetarium.....							1				1	1		1			1
Total.....	72	53	4	1	14	14	115	114	1	2	12	12	80	79	3	10	75



## CITY, GARRISON, AND PORT OF GIBRALTAR.

*Quarantine questions put to the captain of ——— and answered on his word of honour.*

1st. From whence is the vessel you command? How many days have you been on the passage? Have you touched anywhere?

2d. Did you sail in pratique from the ports or places you have stated? If you have any bills of health produce them.

3d. Have you communicated with any vessel in the course of your cruise or passage? If so, what state of health were they in? From what ports were they; and how many days have elapsed since such communication?

4th. In the course of your cruise or passage, has any contagious disease manifested itself on board? If so, since when?

5th. Have you any passengers on board? If so, state their names, country, and occupation, to what place they are going, and whence they came.

6th. Did you hear of any report, or are you aware of any suspicion having existed in the vicinity of the port from whence you sailed, or in or near any others at which you have touched, that the plague, or any other infectious disease, was prevalent?

7th. Has any death taken place on board your vessel since you left the last port? If so, state its nature to the best of your knowledge.

By command of his excellency the governor.

JOHN M. CREBS,

*Captain of the Port.*

## U. S. S. ALLIANCE.

## REPORT OF SURGEON J. H. KIDDER.

*Hygiene.*—The complement of the ship at the time of being commissioned (January 8, 1877) was 157, viz: 18 officers, 26

marines, and 113 blue-jackets. At the close of the year the number on board was 160, the average standing between these figures. Following is a tabulated statement of the berthing and air-space allotted to these persons:

TABLE A.

Locality.	Number of occupants.	Total cubic air-space.	Cubic feet to each person.
Cabin.....	1	2, 246	2, 246
Wardroom.....	10	3, 750	375
Steerage.....	8	2, 614	326.8
Berth-deck.....	116	8, 324	71.7
Sick-bay.....	6 average.	1, 106	184.3
Cells.....	1	115	115
Top-gallant fore-castle.....	16	Practically open air.	
Total.....	158		

The loss of labor to the government, by illness, during the year has been as follows:

TABLE B.

Period.	Percentage of sickness.	Total number of days lost.	Daily average loss per man.	Number of admissions.
First quarter.....	33. 54	216	244	53
Second quarter.....	46. 20	422	488	73
Third quarter.....	35. 44	475	561	56
Fourth quarter.....	44. 30	397	468	70
Year.....	39. 87	1, 510	4. 25 nearly.	252

There were no deaths.

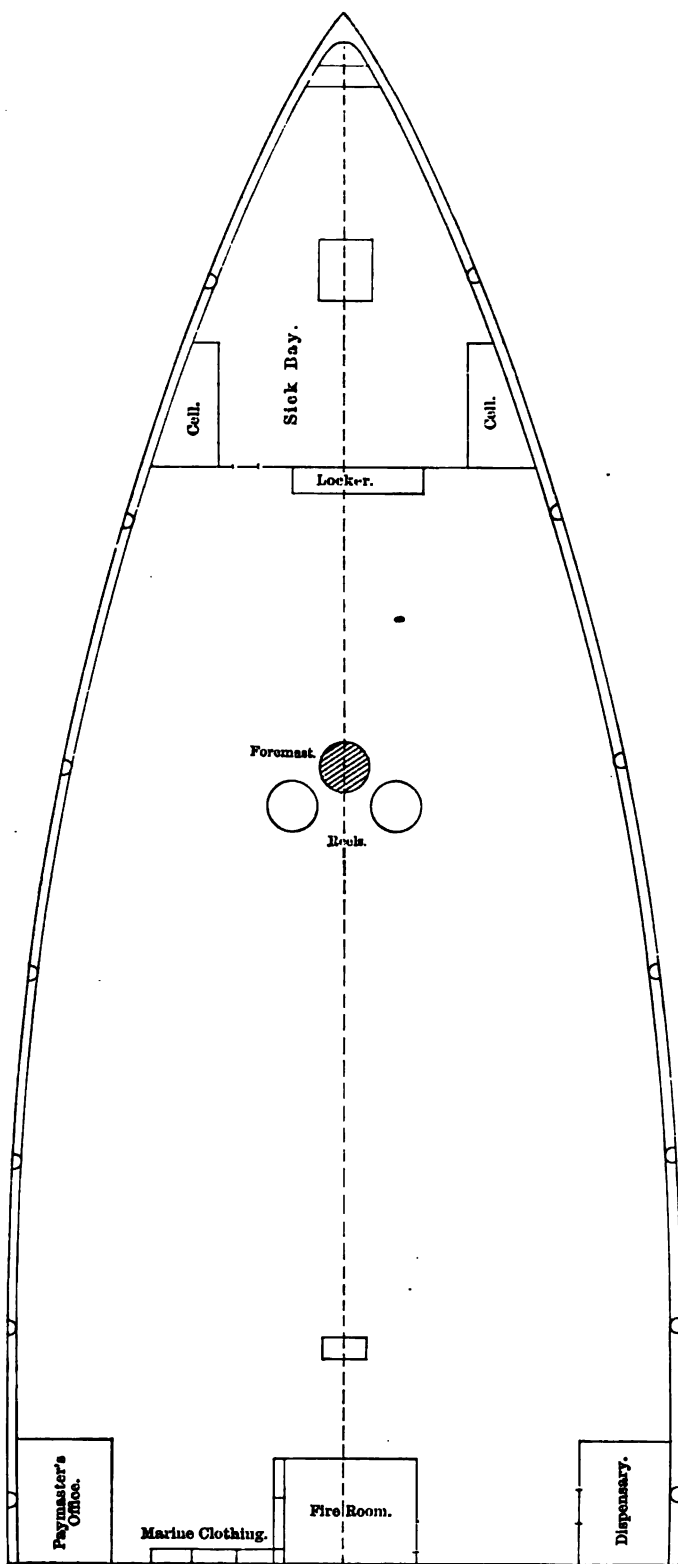
The cubical contents of the different parts of the ship as above stated (Table A) is in excess of that actually available, because of the space occupied in the cabin, wardroom, and steerage by the movable furniture, shelving, etc., and on the berth-deck by large lockers for marines' clothing, and for paints, oils, and wardroom-boys' clothing, two large reels, the fore-mast, heater, the men's bags which hang around the sides of the berth-deck, and all the mess-chests, besides the space occupied by the men themselves. In estimating the cubic air-space allotted to each man, on the

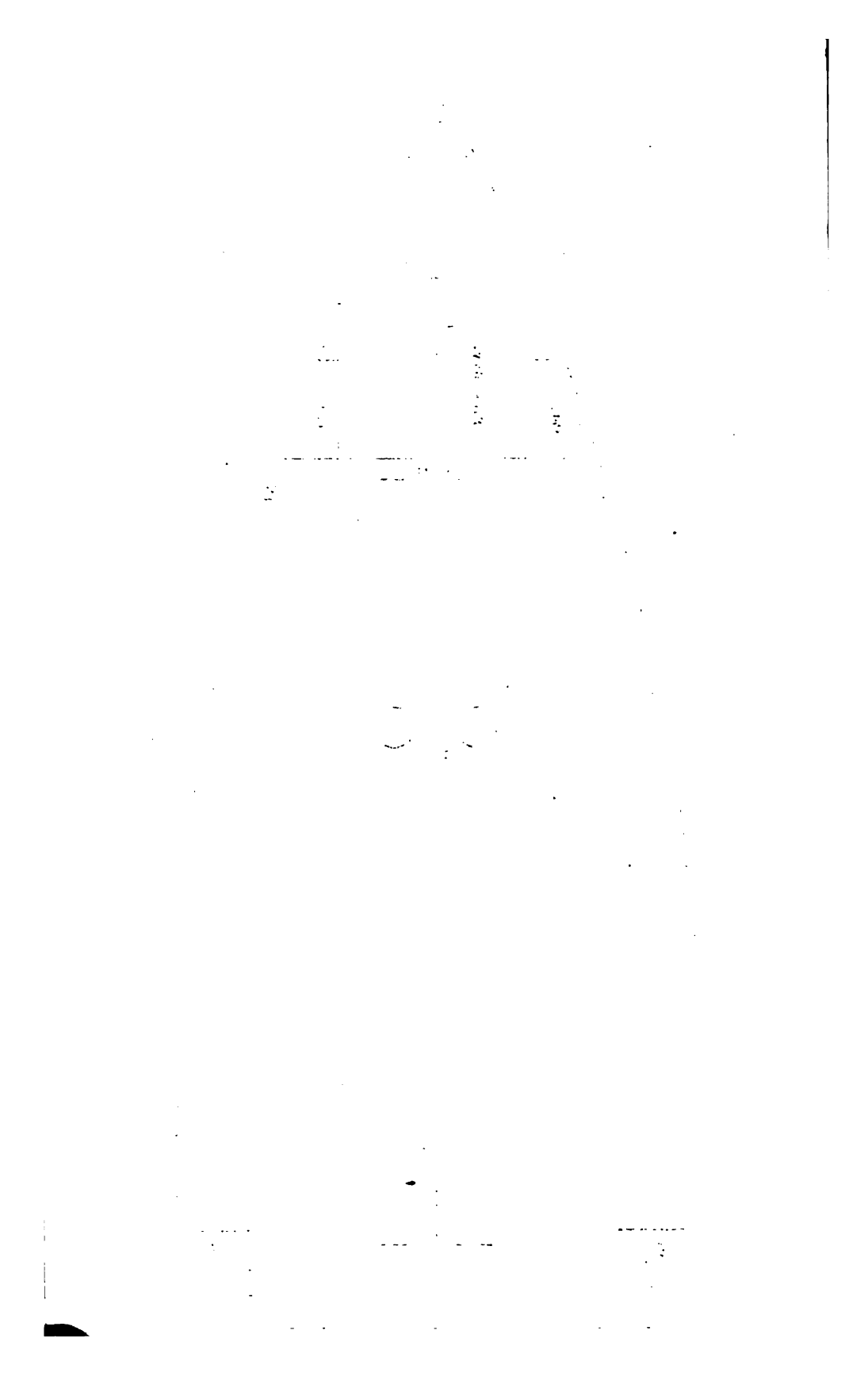
other hand, the fact should be taken into consideration that even in the worst of weather one watch (say 40 men) would always be on deck, while an average of rather more than 4 sick and the apothecary and bayman would be in the sick-bay. These two persons were so inconveniently billeted at the outset (one obstructing the sick-bay door and the other much incommoded by one of the coal-shutes) that I found it desirable to make room for them within the sick-bay. Deducting 46, then, from the number (120) allotted (Table A) to the berth-deck, there remain 74 men to occupy 8,324 cubic feet of air-space, or 112.5 cubic feet for each, subject to the considerable deductions above mentioned.

The cabin, which is on the spar-deck, is well ventilated and lighted by large hatches, square window-ports, and the doors which open on the deck on each side; it is sufficiently heated by a steam-coil in the forward cabin, the arrangement of which is defective in that the heat must first be cut off from the ward-room in order to warm the cabin. The wardroom is ventilated by doors and grated windows communicating with the steerage, by two adjoining skylights at its forward end (4 feet 8 inches by 4 feet 3 inches, and 2 feet 6½ inches by 4 feet 8 inches), and by two copper ventilators, 10 inches in diameter, leading from the pantry (in the after part of the wardroom) through to the poop-deck. These ventilating-tubes are on this vessel very effective, always showing a strong up-draught of air, to the great improvement of the comfort of those occupying the after part of the wardroom. In pleasant weather the skylights above referred to are kept open, and ordinarily the dead-lights in the state-rooms can also be opened while in port. The supply of light in the forward part of the wardroom is always sufficient, while the after part is usually inconveniently dark. A steam-heater, similar to that in the cabin, can supply more heat than has thus far been required. The steerage is well venti-

lated and lighted by the large hatch through which the ward-room and steerage ladders pass, and sufficiently heated by a steam-coil. On the port side there are two rooms, similar to those in the wardroom, occupied by a master and two ensigns, the after room being double bunked. The starboard steerage is a single apartment without bunks, but provided with lockers along the side. A door opens into the engine-room on the starboard side, through which, when opened while the ship is under steam, there is a strong draught of air from the steerage into the engine-room. The berth-deck is ventilated by two hatches measuring 5 by 4, and 6 by 5.2 feet, always open in dry weather, by 14 dead-lights which are always closed at sea, but open while at anchor in smooth water; and by two windows and a door communicating with the fire-room, making it possible to get air communications through the ship fore and aft, or, when fires are lighted, toward the fires from both forward and aft. This door and these windows were at first kept closed on account of the difficulty of keeping the berth-deck clean. The air between decks became so vitiated, however, as the weather grew warmer that the door was opened, being covered by a grating to prevent its use as a thoroughfare, and an opening was cut through the bulkhead on the port side, where the marine guard is billeted. The two window-ports still remain closed. In hot weather two windsails are kept constantly set for the berth-deck, one leading into the fore-passage. The ventilation of the berth-deck, although the air is still foul during the night, is as good as it well can be under the circumstances, and considering the small air-space allotted to each man. The berth-deck is lighted by the hatches and ports above mentioned, and sufficiently heated by a steam-coil similar to those in the other parts of the ship; a bulkhead lantern is kept burning all night.

The sick-bay is well ventilated by a special hatch 3 by 2½





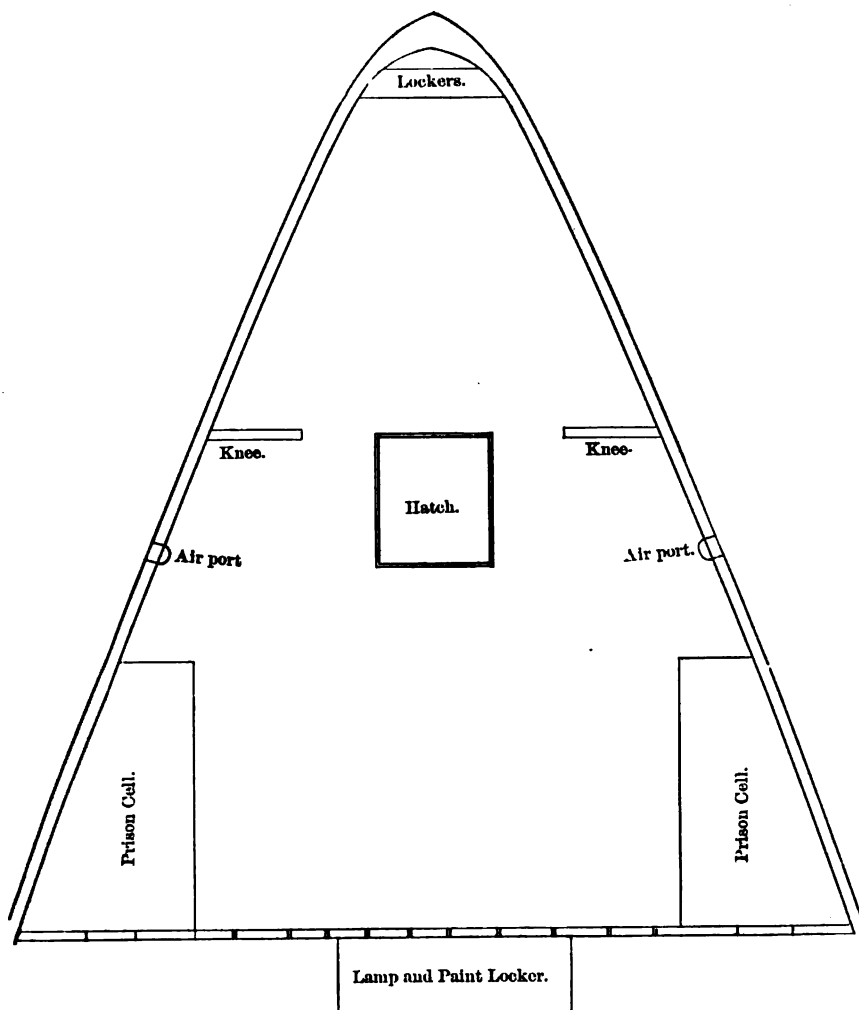
feet, in line with one above which passes through the top-gallant forecastle, and with another below opening into the yeoman's store-room. The latter has been grated with iron bars so as to be kept constantly open. A windsail can be passed through these hatches into the sick-bay or the fore-passage as desired. A steam-coil of the same size that is provided for other portions of the ship supplies sufficient heat, but the light is exceedingly poor, making it necessary to use candles throughout the day, and always difficult to conduct physical examinations properly. The sick-bay is quite as large as is usual upon vessels of this size, but the space available has been so encroached upon as to be very irregular, a cell having been taken out from the widest part on each side, and very large knees projecting into the bay near its forward end. It results from this irregularity of form that three cots are the most that can be slung at the same time, and that then it is very difficult for the attendants to move about among the sick. The ship's bell, which is a very large one, is hung directly above the hatch, and, as it happens, in such relation to the surrounding parts of the ship that it sounds nowhere so loudly as in the sick-bay. In cases of serious illness accompanied by headache and insomnia, this startling sound, often repeated, becomes really of serious importance, and worthy of consideration in the arrangements of parts of ships hereafter to be constructed, or fitting for sea. I can see no sufficient objection to placing the bell entirely outside of the top-gallant forecastle, on the open deck, whence it could be more distinctly heard in the different parts of the ship, and would cease to annoy the sick and those berthing under the forecastle. Occasionally, but less frequently than I should have expected, the noise of drunken men confined in the cells at night has been an annoyance to the sick. In general the sick-bay of the *Alliance*, while by no means worse than the average, illustrates well the justice of the obser-

vations of Commodore Shufeldt, in the last report of the honorable Secretary of the Navy (see Report for 1877, p. 123): "At present the sick-bay is thrust in the extreme forward end of a ship, and is eminently well calculated not only to make a man sick, but to keep him so, from its position, the absence of light and air, and the usual want of the conveniences which a patient requires. I believe that the plan of placing the hospital of a ship in just the place where it ought not to be has been abandoned in every navy but our own."

The prison-cells which have been taken out of the sick-bay space on each side, are ventilated each by a window  $17\frac{1}{2}$  inches square, reduced by 11 perpendicular iron bars to  $17\frac{1}{2}$  by  $10\frac{1}{2}$  inches. This window having been cut through the upper part of the cell-door fails, there being no other aperture by which a draught can be produced, to afford sufficient ventilation to the lower portion of the cells. The doors are, however, opened for half an hour each day, by order of the commanding officer, and it is only in very warm weather that serious injury to the health of the prisoners is likely to result from the accumulation of foul air. It would be advisable, in my opinion, to provide prison-cells on shipboard with an iron door grated throughout, such as are used in most State prisons and penitentiaries of the United States.

The dispensary is situated in the aftermost starboard corner of the berth-deck, at an inconvenient distance from the sick-bay. It is insufficiently ventilated by an 8-inch air-port, which cannot be opened at sea or during rough weather in port, and by a square opening in the door, covered by a wire grating. Owing to the near neighborhood of the boilers it becomes necessary in hot weather to remove the ether and other volatile and inflammable liquids to the sick-bay. Always when coaling ship, or under steam and using coal from the starboard bunker, immense quantities of coal-dust sift through the bulkhead, mak-





PLAN OF SICK-BAY, U. S. S. ALLIANCE.



ing it quite impossible at such times to use the dispensary at all. It is desirable for many reasons that the sick-bay should adjoin the dispensary, either by establishing the sick-bay amidships, as on board the Trenton, or by turning a part of the space now given up to prison-cells into a dispensary. My own preference is for the former arrangement, the midship portion of the ship being less noisy, less affected by motion at sea, and a part where such space as can be spared for the care of the sick can be taken out in a rectangular form, and thus be made to accommodate as many persons in cots as possible. A water-closet might perhaps also then be attached to the sick-bay, although it is doubtful if this would be an advantage on the berth-deck.

The bilges of the Alliance have thus far been unusually sweet and clean, great care having been exercised in this direction by the commanding officer and executive. In the construction of this vessel more regard was paid to the possibility of getting at the bilges after the men and stores should be on board than has seemed to be usual of late years; and instead of the practice which has prevailed of ventilating the spaces between the timbers and the inner and outer courses of planking by openings into officers' state-rooms and along the berth-deck, a series of openings has been practised a short distance below the hammock-rails (five on each side), covered by gratings and capable of being closed by floating ball-valves within, in case of shipping very heavy seas. It is desirable to increase greatly the number of these openings, so as to afford one to each space between the timbers.

More than twenty years ago Dr. J. B. Fonssagrives, medical inspector-general of the French navy, pointed out (*Hygiene Navale*) the danger attending the almost uniform practice by navy-yard workmen of planking up their chips and auger-dust in applying the inner skin of a ship. The hull thus becomes

a series of four-sided tubes, bounded fore and aft by two neighboring timbers, and within and without by the planking, and extending upward from the dead-rise, from which to the keel the hull is filled in solidly. It is intended to leave communication open between these spaces and the bilge, but the practice of brushing the chips and shavings inside and then planking them up results in closing many of the lower bilge-outlets, which are, moreover, of a form that is particularly liable to be choked; and so retaining a considerable mass of organic matter to be acted upon by changes of temperature, leakage from the engine and fire rooms and the hold, and constant moisture. A large French frigate became a floating pest ship from this cause alone, as Inspector Fonssagrives states, and made two voyages, fatal to a very large proportion of her complement, before it was discovered. The medical records of the *Swatara* and *Monongahela*, now on file at the bureau, show very clearly the suffering, danger to life, and loss of service resulting to the government from the practice of opening these tubular spaces, many of which are little else than portable centres of malaria on the berth-deck. On the *Trenton* the openings have been closed, and much labor has been found necessary to make the bilges endurable. The comparative immunity of this ship from zymotic diseases which can be traced to local causes is due, it is but natural to suppose, to the precautions above mentioned. I would suggest as improvements an increase in the number of the openings under the hammock-rails, so as to tap every intertrabecular space, and the use of small limber chains, which would greatly facilitate the flushing of the bilges.

Food is of the regular Navy ration, always of good quality, with the addition of fresh meat and vegetables when in port, and of access to the bumboats at meal-time, the latter being frequently inspected by the surgeon. Both the food and clothing of the men on this ship are exceedingly well cared for, so

that there has been no ground for reasonable complaint upon these scores.

Water of good quality is furnished by condensation, the ship being provided with a Baird's still which works well. It is necessary to change frequently the supply of animal charcoal through which the water is finally passed, and to allow it to stand for 48 hours in the tanks before using, to insure potability. The still is capable of supplying about 900 gallons per day, but has never been worked up to that capacity. The character of the water at the several places visited will be described under the head of Medical Topography.

The general health of the ship's company has, on the whole, deteriorated during the year, and the capacity of the crew for enduring fatigue and exposure diminished. Very many more persons are treated than are excused from duty; boils and carbuncles and frequent cases of diarrhoea indicate impairment of blood, and chronic cases of syphilis and rheumatism show a tendency to relapse. This state of affairs is the natural result of at least three causes which are recognizable, viz: first, exposure to extreme heat, with but few opportunities for liberty on shore, during the nine months spent in Syria, Smyrna, and Constantinople (with much wet weather at the latter place); secondly, the great heat of the fire-room, ranging between 120° and 150° Fah.; and thirdly, the excessive use of water upon the berth-deck. The first of these causes is of course unavoidable, being one of the exigencies of the service. The second was not in operation often nor for very long periods, although its influence was very obvious; a short time under steam bringing so large a proportion of the engineer's force down for medical treatment that many had to be kept on duty who would ordinarily have been excused. The third cause is the only one within the reach of immediate remedy. The berth-deck has been wet, on the average, about every other day, and holy-

stoned twice a week during the past year. During the months of May and June it was wet daily, the practice being changed to every other day about the end of June, upon my recommendation. How large a proportion of the time lost by illness on this ship is due to this cause I am unable to say. But there is no longer a difference of opinion among medical men as to the injurious effect of wet berth-decks upon the health of the crew, and the frequency of its occurrence upon this vessel seems to me to be excessive. I have so represented it to the commanding officer both verbally and in writing. For more minute details upon this subject I beg leave to refer to my letters of July 1 and October 1, accompanying the Quarterly Reports of Meteorological Observations.

Muscular neuralgia, particularly under the form of lumbago, and sciatica have been endemic in the ship to a very unusual degree. Most of the ship's company have suffered in this way to a greater or less extent, a large proportion of the cases having been treated off the list, as not sufficiently severe to excuse the patient from duty, and therefore not appearing on the records. At least one case will have to be sent home as not likely to recover, without the intervention at any time of articular inflammation. The treatment most generally successful has been faradization of the affected part.

A circumstance which affects unfavorably the health of the coal-heavers particularly is the position of the passage leading into the coal-bunkers; low, between two of the boilers, shut in overhead by the steam-drum, and not susceptible of ventilation. When the ship is under steam this passage-way becomes filled with injurious gases, such as carbon dioxide, carburetted and sulphuretted hydrogen, while the temperature rises to a much higher point than even that of the fire-room. During the months of March, April, and May an ounce of spirits was issued to each man working in the fire-room at the end of his watch, the moment

when he would be likely to run the most risk from exposure to a sudden reduction of temperature while greatly exhausted. After the month of May the practice was given up, partly because of the considerable expense attending it, and partly on account of the difficulty of preventing its abuse and of keeping an accurate account of the expenditure. The effect of the issue of spirits, in the way described, was certainly beneficial, but few persons suffering sufficiently from the heat to require to be excused from duty while it was continued. The daily amount expended averaged 60 ounces.

The movements of the ship during the year have been as follows:

Commissioned January 8, 1878, at Norfolk, Va.

Hampton Roads, February 16; returned to Norfolk March 5.

Sailed for Lisbon March 8, arrived April 3.

Sailed for Gibraltar April 10, arrived April 12.

Sailed for Villefranche April 14, arrived April 17.

Sailed from Villefranche April 25, arrived at Alexandria May 3.

Sailed for Haifa (Syria) May 5, arrived May 7.

Sailed for Beirut May 8, arrived May 9.

Sailed for Latakia May 15, arrived May 16.

Sailed for Mersene May 17, arrived May 18.

Sailed for Tripoli May 19, arrived May 20.

Sailed for Beirut May 21, arrived May 21.

Sailed for Smyrna July 11, arrived July 16.

Sailed for Salonica August 25, arrived August 26.

Sailed for Smyrna August 29, arrived August 30.

Sailed for Constantinople September 10, arrived September 12.

Sailed for Dardanelles December 8, arrived December 9.

Sailed for Mitylene December 11, arrived December 11.

Sailed for Smyrna December 13, arrived December 13.

*Medical topography.*—The first foreign port visited was Lis-

bon, where, at the time of the arrival of the Alliance, it was contemplated to establish the American naval station, instead of continuing that at Villefranche. During the week spent there rain fell every day. No hospital on shore was visited. Excellent water is to be obtained from shore, brought to the city through the famous aqueduct of João V.

*Gibraltar.*—Here, also, rain fell almost continually during the visit of the Alliance. No water was taken from shore. The supply of the town is rain-water, collected in an immense cistern, well up on the hillside. At this port the surgeon is required to fill out a blank, provided by the health officer, stating the equipage, sanitary condition, etc., of the ship, before obtaining pratique.

*Villefranche* is during most of the year a healthy place, rheumatic and intermittent fever prevailing to a small extent in the autumn. Being on the southern side of the hill which separates it from Nice, it is perceptibly warmer than the latter place. There is a good hospital, well up on the hillside, belonging to the sisterhood of St. Vincent de Paul, and under the medical superintendence of Le Commandant B. de Montolivo, a retired French naval surgeon. The hospital is clean, and the nursing and attendance excellent, the principal objection to it being the depressing character of the treatment pursued and the too low diet prescribed in most cases. Medical officers are, however, allowed to treat their own sick in the hospital if they prefer to do so. Charges are moderate. Fairly good water can be had on shore, somewhat hard from the presence of carbonate of lime and magnesia, and, as it reaches the ship, containing rather an excess of chlorides. A branch of the Nice aqueduct supplies Villefranche with the same water that is used in Nice, which suffers under the disadvantages mentioned above.

*Alexandria.*—But two days were spent at this port, and no water was taken on board. Health-officer visits the ship, while



in all other Turkish ports (except Salonica) it is necessary that the medical officer should go ashore to get pratique. Note, also, that pratique is not granted in Turkish ports after sunset or before sunrise. There is a very good hospital in Alexandria, the property of the Deaconesses of Kaiserswerth, a charitable order, with which all medical officers on duty in the Levant must soon become gratefully familiar. The hospital is extensive and well ventilated, kitchen and laundry well organized, and water-supply (from the Nile) sufficient. The wards are cheerful and exquisitely clean, and the nursing of the deaconesses as good as possible. The sick of all nationalities are received at a charge of 2 francs per day for the general wards, 5 francs for rooms containing two beds each, and 10 francs for private rooms. No formality is necessary in sending patients to the hospital.

*Haifa* is a small port across the bay from Acre. No water was taken on board. There is no hospital or other provision for the sick. A Russian physician, since the outbreak of the war under German protection, attended to the medical wants of the foreign population. On the lower slope of Mount Carmel, which is near by, is a Lutheran colony, made up largely of German-Americans, from Western New York. Diseases of malarial origin are very prevalent during the hot months and early autumn.

*Beirut*.—The Alliance remained at this port for two months, with short excursions to Tripoli, Latakia, Mersene, and Sidon. The medical topography of these ports presents no points of interest. All of them are unhealthy, and unprovided with hospital accommodation. At Latakia Dr. Metheny, the United States vice-consul and head of the missionary school establishment, treats all comers. At the other ports named there is, so far as I know, no good medical service. Beirut lies at the foot of the coast-tier of the Lebanon range. It is, after Smyrna, the

most important commercial city of Asiatic Turkey. Excellent water is provided by the English Aqueduct Company from the Dog River, a large stream which comes out of the mountain some six miles away. At the water-works there are storage-reservoirs and settling-tanks, with upward filtration. Thence the water is brought to the city in pipes. This water may be taken on board without scruple, being much the best to be found in the Levant. There being no water-boat, care should be exercised in the examination of the casks used by the *compradore*. There are several hospitals in Beirut, belonging to or supported by the different religious sects. A large military hospital, belonging to the Turkish Government, is under the charge of Dr. Sartin-ski, surgeon (lieutenant-colonel) in the Turkish army, but a Pole by birth. Under his charge the hospital has been brought to a state of high efficiency; in marked contrast, as I am informed, to its squalid and slipshod condition under native management. The building is very extensive, with accommodations for about 300 patients without crowding, and a possible capacity for over 600. The ceilings are 20 feet high, windows large, and air and water-supply excellent. The latrines, all built in the Turkish fashion, of marble and without seats, are in a separate tower-like structure, accessible from each floor, but so arranged as to exclude all offensive odors from the main building. Bedsteads are of iron, furnished each with a straw mattress, above which is another, thicker, stuffed with cotton, a sheet, padded coverlet, and blanket. The floors of the wards are of stone, wood-work being conspicuous by its absence throughout the building. Diseases are well classified and separated, a procedure not common in Turkish hospitals, and the diagnosis of each case is chalked up on a small blackboard at the head of the bed. A patient entering is kept for a time in a ward of observation (*purgatoire*) on the ground-floor. When he has been thoroughly cleansed and his diagnosis made out he is furnished

with a suit of hospital clothing and sent to the appropriate ward up-stairs. The prevailing diseases among the soldiers are, in the order of their frequency (as shown by the records of this hospital), affections of the eye, particularly interstitial and ulcerative keratitis, intermittent fever (quotidian and tertian), typhoid fever (generally fatal), dysentery, diarrhoea, and pneumonia. Syphilis is rare. This hospital, belonging exclusively to the Turkish military establishment, is not open to our sailors. It will well repay the medical officer who may visit it, however, being one of the best specimens of its class to be seen, and illustrating the Turkish medical organization in its best development. At the extreme right hand, as you face the city of Beirut, occupying a prominent position on the point which bounds the city to the south, is the Syrian Protestant College, of which a flourishing medical school is a part. The college is entirely under the charge of American professors, and supported by American and English contributions. Both the college and medical school afford an agreeable surprise to the visitor, who is by no means prepared for so advanced and thorough a course of instruction as is here afforded. There are two lecture-theatres, a good dissecting-room, several recitation-rooms, a small chemical laboratory, and a very unexpectedly advanced museum. Here are to be found wax mannikins and mechanical papier-maché models of the eye, ear, uterus and appendages, ova at different stages, anatomical models on a large scale, showing the parts of plants and the principal points in the comparative anatomy of animals, and the nucleus of a zoological collection, particularly rich in birds. Here, also, is the most complete collection extant of the flora of Syria, labelled and classified, the work of Dr. George E. Post, professor of surgery to the college, and son of the distinguished New York surgeon. Instruction is given in Arabic, into which language the text-books now in use have been translated. An excellent hospital, belonging to

the Knights of St. John and supported by that fraternity, is situated high up on the hill which is occupied by the southern portion of the city; it is under the care of Deaconesses of Kaiserswerth, and furnished with medical and surgical service by the faculty of the medical school. The number of persons treated at the out-door clinic during the last year exceeded 14,000. An excellent opportunity is thus afforded for the clinical instruction of the students, who do much of the out-door practice, under the supervision of a member of the faculty. The course is four years in length, with an examination at the end of each year. I took advantage of the opportunity afforded me to attend several of the recitations, and am of the opinion that these young Syrian students will compare favorably in point of scholarship with the undergraduates of our best medical schools in the United States, taking into consideration the fact that their studies are limited to the few text-books as yet translated into the Arabic. In compensation for this deficiency, more attention than usual has been paid to clinical instruction. The fame of the college and hospital has so grown and spread in Syria that most of the serious cases for operation are brought to Beirut. There are few important operations in surgery which these students do not get an opportunity to witness during their course of instruction, and some of the graduates of the school have already made a considerable and well-deserved local reputation. Dr. Mashaka, for example, of Damascus, has operated eighty times for stone in the bladder, with but two deaths. I have been particularly struck by the remarkable success attending the after treatment of surgical cases in this country. The most serious operations proceed to recovery, as a rule, without any of the accidents which we have partly learned to dread in the United States. Dr. Post is disposed to attribute this remarkable exemption from the accidents commonly attending surgical operations partly to the temperate habits of the people

and partly to the great rarity of constitutional cachexies. Within the past five days I have witnessed the operation for stone (median), excision of left elbow, the removal of a considerable portion of the mastoid process of the right temporal bone, and extraction of a bullet imbedded in the mastoid cells, several minor operations upon the eyes, as for entropion, removal of pannus, etc., and two plastic operations upon the face. All of these cases are progressing rapidly toward recovery, without surgical fever or other sign of danger.

The city of Beirut is in latitude  $33^{\circ} 54'$  north, longitude  $35^{\circ} 29'$  east, occupying a large part of the plain, 3 miles in width, intervening between the coast and the foot of the coast-range of Mount Lebanon. The temperature rarely falls below  $45^{\circ}$  Fah. in winter, or rises above  $85^{\circ}$  Fah. in summer. From the daily observations of a French medical officer who has for a long time kept a thermometric record, the following monthly means (for 1868) have been deduced:

	$^{\circ}$ Fah.		$^{\circ}$ Fah.
January .....	53.31	July .....	77.09
February .....	52.61	August .....	77.61
March .....	59.68	September .....	77.75
April .....	60.56	October .....	71.87
May .....	68.10	November .....	64.32
June .....	73.72	December .....	56.84

The barometric pressure, as observed by Mr. G. J. Eldridge, Her Majesty's consul-general for Syria, at an elevation of 170 feet above the sea-level, during the first five months of the year 1869, was as follows:

Months.	Average barometer.	Difference between wet and dry bulb thermometers.
	<i>Inches.</i>	$^{\circ}$ Fah.
January .....	29.93	3.72
February .....	29.98	3.97
March .....	29.79	4.31
April .....	29.92	4.43
May .....	29.87	4.50

The "early and latter rains" occur in the autumn (October, November, and December), and spring (January, February, and March), the former being much the heavier of the two. At other times of the year there is no rainfall. In winter the prevailing winds are from the southwest and north. In the later spring and early summer there are usually several days of "sirocco" from the east-southeast. During the summer the prevailing winds are westerly, but occasionally from the north. In the autumn the wind comes usually from the north and northwest. During the warm weather there is a decided sea-breeze almost daily. More detailed meteorological observations made on this ship at Beirut during the months of May, June, and July, are given in my reports dated July 1 and October 1, already referred to.

The only disease that can properly be said to be indigenous to Syria is a form of pernicious fever, here called, "Syrian fever." It is accompanied by severe gastric disturbance, attacks especially tourists who have been making the very fatiguing horseback journey through the interior of the country, and is likely to prove fatal in the second or third paroxysm. All affections of the eye, particularly purulent ophthalmia, are exceedingly common here, as elsewhere in the Levant. Intermittent fever prevails in the low lands bordering the *débouchure* of the Beirut River, which runs through the town, and typhoid fever prevails so extensively at times that it may be called epidemic. Dysentery and diarrhœa are quite common, being traceable, in common with the two last-named diseases, to the very defective drainage of the city, and the contaminated water still used by the majority of the population, on account of the cost of that supplied by the Dog River Aqueduct Company. Diphtheria is frequently met with, while scarlatina is unknown. Chest affections exist in about the same proportion here as in other parts of the world. Leprosy is frequent in the interior, and is quite

common about Jaffa on the coast. There is occasionally an epidemic in Beirut (in the spring or summer) of what is called the "knee-fever" (*abu-rikab*) a febricula of seven days' duration, and characterized by gastric disturbance and very severe pain in the knees and loins. It is not dangerous. Once in a while there is seen a case of so-called "Aleppo button" or "year pimple"—an importation, since the disease does not arise in the neighborhood of Beirut. This very singular and little-known disease appears to attack only those who use the water of the Tigris and Euphrates, being much more common at Bagdad than at Aleppo and Mosul. Foreigners suffer as well as natives, and it is said to be very rarely that any one escapes. It is not contagious, does not attack the same person more than once, nor is it auto-inoculable. Its duration is about a year. It appears usually in the autumn in the form of a small tubercular pimple, unaccompanied by much itching or pain. After remaining stationary for some months it begins to heal in the centre, leaving a depressed, permanent cicatrix. In a case I saw of some five months' standing, there was a distinct central cicatrix, like that from a burn, surrounded by squamo-papular elevations. It usually attacks natives at about the time of the first dentition; rarely after puberty. Nothing accurate is known, so far as I am aware, of the pathology of this disease, nor has any treatment yet been found to be efficacious. For most of the foregoing facts of its clinical history I am indebted to Dr. John Wortabet, professor of anatomy at the medical school. Being a native Syrian, Dr. Wortabet has had exceptional opportunities for observing the hygienic conditions of the country, and the progress and causation of its prevailing diseases. The vicinity of Beirut is a limestone region, and as is so often the case in such districts, lithiasis is one of the commonest diseases; and cutting for stone probably the most frequent capital operation performed at the St. John's Hospital. As mentioned above, a much greater de-

gree of success attends this and other serious operations in this country and with this people than can be expected elsewhere. Dr. Post has passed his one hundred and fortieth case, and his pupils are operating successfully and frequently in all populous parts of the country. Those who use the Dog River water seem to be much less liable to lithiasis than those who depend upon the wells and smaller streams. Caries of the bones of the hands and feet, particularly of the metacarpal and the tarsal bones, occurring as an idiopathic affection, without any history of serious injury, is sufficiently common to attract the attention of every visitor to the hospital. The attending surgeons are disposed to attribute the frequency of such affections to defective nutrition, rather than to any prevailing cachexy or constitutional taint. The poorer classes, among whom such diseases particularly prevail, are for a large part of the year on the verge of starvation; and this state of affairs has been rather aggravated since the outbreak of war.

Patients from men-of-war are received into the St. John's Hospital at a charge of 2½ francs per day, or 5 francs for a separate room.

*Smyrna*.—The Alliance anchored in this port July 16, remaining until September 10, including a short voyage to Salonica. Returning from Constantinople December 13, she remained in Smyrna until the end of the year.

The modern city covers most of the base of an extensive hill (Mount Pagus), standing nearly parallel with the shore, and at the eastern end of the bay. This hill is surmounted by a conspicuous ruined citadel dating from the Genoese occupation of the city, and still in good preservation. Beyond this hill to the north-east is a deep and wide valley, through which flows the river Meles, and by which passes the railway through the Aidin Valley. The river is crossed by two imposing aqueducts of Roman construction, by one of which (passing through Mount Pagus by a



tunnel) the best water to be had in Smyrna is still supplied. Within a few years a French company has obtained the right to the water front to the city and has built an excellent stone quay along its whole extent, with a spacious basin inclosed by a sea-wall. The health-office is at the extreme distant corner of this basin, about a mile by water from the usual anchorage; and thither the medical officer must go for pratique as soon as the anchor is down. He will find it more convenient to land on the quay opposite his ship and take passage in one of the horse-cars which run along the quay. No objection to his landing will be made by the customs authorities. To the west, and distant from the anchorage about five miles, is Pelican Spit (Yani Kadeese), a low, marshy point, uncovered during the summer months, over which the sea-breeze blows. The water used in Smyrna is, as a rule, bad; being hard and containing an excess of magnesian carbonates, it is likely to produce decided intestinal irritation in strangers. Excellent water can be obtained for ship's use, however, from the aqueduct above referred to, if sufficient care be taken by the medical officer to prevent the substitution of artesian-well water by the compradore, and to secure the cleansing of the water-boats, the latter being often leaky. Summary examination of this water showed it to be of six degrees of hardness and quite free from organic impurity. An attempt was made at least once to substitute inferior water, which was sent back, and twice water was rejected on account of leaky boats. Rain rarely or never falls between the months of April and November, the mean rainfall for the rest of the year being 26 inches. Mean annual temperature, 61° Fah. The highest thermometer observed in the year 1870 was 104° Fah., and the lowest 26° Fah. Temperature was below 32° Fah. but 17 days during the year. Snow is rare and very transient in the city, but plenty falls in the neighboring mountains, whence it is packed down on donkeys

for summer supply. The prevailing wind is the "*imbat*," during the summer months, a powerful sea-breeze, varying between west and northwest. For more detailed meteorological statistics I beg leave to refer to report sent to the bureau October 1, 1877. There is no sanitary service in the Turkish Empire, nor any official figures bearing upon the subject of public health. Such imperfect information as I have been able to get is derived from a report compiled by the Austrian consul-general, M. de Schwerzer, for the Vienna Exposition, entitled "*La Province de Smyrne*" (Vienna, 1873), and from conversation with medical practitioners on shore. Being built upon low land, and, with the exception of the French quarters, drained only by gutters along the centres of the narrow, ill-paved streets, with no municipal regulations upon the cleanliness of the highways, and an absolute disregard of the same duty on the part of the inhabitants, it is rather a disappointment to find Smyrna to be as healthy a city as it is. Epidemics, when they do occur, make a pretty clean sweep, having everything in their favor. At other times, thanks to the daily powerful *imbat*, and the absolute dryness of the summer season, there is no remarkable prevalence of disease until after the first rains. While the valley of the Meles, just beyond Mount Pagus (and protected by the mountain from the *imbat*), is absolutely uninhabitable after the first warm days of spring, owing to diseases of malarial origin, the percentage of disease in Smyrna does not perceptibly increase until September. Diseases which may be considered endemic are those of paludal origin, including a pernicious intermittent, typhoid fever, scarlatina, diphtheria, and purulent ophthalmia. Small-pox and measles are frequent; croup rare. Cholera has been several times introduced from Alexandria and Constantinople, and has proved very destructive. Lithiasis is here also quite common, owing to the hardness of the water. A fever, supposed by some to be identical with yellow fever, ap-

pears often at Smyrna during the summer months. It is characterized by jaundice, vomiting of grumous blood, intense fever, and severe nervous prostration, often delirium. There is no trustworthy evidence of the introduction of this disease from abroad, and the better class of practitioners do not hold to the yellow-fever theory. The Germans call it the "typho-bilious" fever of Griesinger. I saw no cases myself. In so mixed a population venereal diseases are very common, of course, but constitutional syphilis is comparatively rare.

The British Seaman's Hospital, under the charge of Dr. James McCraith, is that usually taken advantage of by men-of-war. There are 20 beds, and the management is good, although on a parsimonious scale. Patients may be sent to this hospital with a certainty that they will receive rational treatment and fairly good nursing. The surgeon in charge, Dr. McCraith, was formerly an assistant surgeon in the British navy, and has been an active general practitioner in Smyrna for many years. Here, as in Beirut, lithiasis is exceedingly frequent, and the percentage of recoveries after operation decidedly greater than prevails in western climates. The medical visitor will find interest in examining Dr. McCraith's large collection of stones removed by himself, usually by the rather uncommon median linear operation. Stone in the bladder occurs in this country at an unusually early age, and is very often found to be encysted. The charge in the general wards here is 3 shillings and 6 pence per day.

On the 25th of August the Alliance sailed for Salonica, and returned to Smyrna on the 30th, having passed two days in port. The weather at Salonica was oppressively hot, and the ship's company suffered greatly in consequence. There is a considerable Turkish military hospital, not open to foreigners, and a Roman Catholic hospital of large size, which I had no opportunity to visit. It is not safe to take water from shore at this port,

nor is it desirable to remain there during the warm weather longer than is absolutely necessary, malarial fever and typhoid prevailing very extensively. Dr. Castellani, the health-officer, is the only one in the Turkish Empire, outside of Egypt, so far as I am aware, who boards men-of-war on their arrival. Throughout Turkey it is necessary to go on shore for pratique, and not always easy, in strange ports, to find the health-officer, usually established in an inconspicuous wooden shed.

Here was first observed a curious circumstance which might have seriously affected the health of the crew. On weighing anchor at Smyrna the chain cable was noticed to be thickly dotted over with a white incrustation, to which but little attention was then paid. The cable was washed in the usual way with the hose and stowed in the chain-lockers. On uncovering them at Salónica, a suffocating stench pervaded the berth-deck, traceable to the chain cable; the white incrustation proved on examination to be made up of the calcareous tubes of small marine worms (*Serpula contortuplicata*), each of which had contained a living animal, the death and putrefaction of which had given rise to the stench referred to. The worms had attached themselves only to that portion of the cable which hung free from the bottom. They adhere too strongly to the iron to be washed off with the hose in the ordinary way. The chain should be laid out on the deck and scraped whenever the animals are observed upon it.

The health of the ship's company was decidedly improved during her stay at Smyrna. Owing to the regularity of the *imbat* and the dryness of the air this port is, in my opinion, the most healthy for men-of-war during summer and autumn of any in the Levant. Vessels anchored in the harbor escape all of the causes of disease to which those on shore are subjected, excepting the heat. The supply of provisions is plentiful and variety

extensive. Prevailing winds are toward the land throughout the summer.

Sailed from Smyrna September 10, bound for Constantinople. Rains were frequent on the following day in the Dardanelles and Hellespont, and a brisk gale with rain prevailed on the night of the 11th. Although the anchor had been down only eleven days, the chain cable was found to be again thickly covered with *Serpula* tubes, some of which had already obtained a length of quite an inch. It is required that all ships going to Constantinople should stop at Chanak, the Asiatic fortress of the Dardanelles, for visé of their bills of health and (in case of men-of-war) of their firmans or permits to enter the straits. On arriving at Constantinople a boat should at once be lowered and sent with the medical officer for a second visé. The health-office is about three-quarters of a mile from the usual anchorage, up the Golden Horn, in a small wooden shed that might easily escape notice. The Golden Horn divides Stamboul (Constantinople proper) from Galata and Pera, which together make up the foreign quarter. These two districts (Stamboul and Galata) are connected by bridges resting upon floats, and are both on the European shore of the Bosphorus. On the Asiatic shore is the city of Scutari, usually reckoned also as a part of Constantinople. Within the limits of Scutari are the great Turkish cemetery, said to be the largest in the world, the British cemetery and monument commemorating the Crimean war, and the large military hospital of Hyder Pasha, built for a British hospital during the Crimean war, and pointed out as a principal scene of Florence Nightingale's labors. This hospital is under the especial patronage of the Sultan, and is, unlike most of those in the Turkish military establishment, under the control of a Turkish surgeon. It is quite extensive, built in the form of a square, with flourishing and well-kept gardens both within and without the inclosure. Pavilions at some distance from the main building

are reserved for cases of hospital gangrene and contagious diseases. The wards on the second and third floors of the main building are surrounded by wide corridors built within the walls. By this arrangement the windows opening into the wards themselves overlook the interior garden, and may be kept closed in inclement weather, light and air being afforded by those in the corridors. At the time of my visit, the war being then at its height, this hospital was overcrowded, and these corridors were quite filled with wounded men. The whole number in the hospital was 1,300, mostly unimportant surgical cases. I saw, however, several cases of amputation, of excision of the head of the humerus, and one excision of a considerable part of the upper jaw, all doing well. Very little mechanical apparatus was in use. Esmarch's bandages were frequently used in amputations, as I was informed, and carbolic acid almost the universal dressing. In hospital gangrene this agent was applied undiluted, with fairly good results. The disease does not, however, show that activity and violence which characterized it in our own armies during the late war, being of an indolent and passive type, and resembling rather the necrosis of defective nutrition than the *foudroyant* destructiveness of active sloughing phagedæna. Twelve surgeons, much overworked, constituted the whole medical force. Probably by consequence of this deficiency in numbers there are no records or statistics of professional value; weekly reports of numbers only are sent to military headquarters. The trifling character of most of the injuries was explained by the fact that those best able to be moved were sent to the rear, their places being filled in the field-hospitals about Adrianople, and between that city and Constantinople, by those more severely wounded. The bitterness with which the war was waged, serves also, unhappily, to explain to a certain extent the comparative rarity, in hospitals, of injuries serious enough to interfere with the escape of the sufferers from

the battle-field. This building, a favorable specimen of permanent military hospitals in Turkey, is amply supplied with air (ceilings are 14 feet in height) and with running water. There is a large window to every two beds, and also smaller openings near the floor for the admission of air, which can be closed at will. Floors are stone or cement, and bedsteads of iron, with bedding of quilted cotton. There is no classification or separation of diseases otherwise than that hospital-gangrene cases are removed to the separate pavilions; and no other medical records of cases than bed-cards. Tolerable cleanliness prevails, although the faint, mawkish odor of pus, so characteristic of badly-kept surgical wards, is everywhere perceptible. The latrines, on the other hand, are of admirable construction, being contained in a separate square tower, with windows all around on every floor, and a plentiful supply of running water. All of the outlets open into a central chute, ventilated upward, and I could detect no odor whatever, even in the closets themselves. In fact there was no part of the hospital which seemed so salubrious and well ventilated as the water-closets. In each wing there is also a Turkish bath with double walls, marble floors, and an intermediate apartment for accustoming the respiration to the increase of temperature. These baths are built of marble, with fountains and pools of hot and cold water. Heated air passes between the doubled walls, raising the temperature to any desired degree, and light is furnished by glass bull's-eyes let into the dome-shaped ceilings. The medical officers represent these baths as of great value in the treatment of all diseases for which diaphoresis is indicated.

So far as I could learn, the Turkish military service is very imperfectly organized and very irregularly and insufficiently paid. It is principally recruited from the Imperial Medical College at Stamboul, receiving a considerable number of young medical men from abroad who are attracted by the opportunities

for practice. A large part of the field-service is furnished by the "Ambulances" (by which are meant not hospital-wagons, but separate movable hospital establishments), by the Red Crescent Society, and by the Stafford House Committee, charitable organizations originating for the most part in England. I was unable to get a firman to visit the hospitals nearer the scene of war, and failed to make a careful examination of the medical school at Stamboul. But these omissions are the less to be regretted since I understand that the subject of Turkish military medical organization has been very carefully studied and reported upon by the surgeon of the Despatch (Dr. Wise).

Water is presented at Constantinople by the compradores from two sources, called respectively Beïcos and Tubaly-fanari. The former is from a running stream some 11 miles away, up the Golden Horn, and is said to be brought for a considerable distance in pipes. The latter is from a fountain near at hand, coming to the surface in the arsenal-grounds, not far from the usual anchorage. As careful an examination as was convenient under the circumstances was made of two specimens obtained from each of two persons proposing to furnish water to the ship, with the following result: Both waters are clear and potable, that from Tubaly-fanari being turbid for a time after heavy rains. Neither contained any appreciable quantity of oxidizable organic matter. Both contained lime, that from Beïcos in greater quantity (owing to leaky boats). Beïcos water shows 8.8 degrees of hardness  $\text{---} \text{---}$  .088 grammes to the litre of sodic or magnesian salts, estimated as sodic carbonate: Tubaly-fanari water shows 14.4 and 13.6 degrees of hardness  $\text{---} \text{---}$  .144 and .136 grammes to the litre of salts as above. The hardness of the Beïcos water is mainly due to the presence of lime, and this is to be preferred, due regard being had to the greater danger from leakage owing to the long distance from which it must be brought; Tubaly-fanari water owes its hardness principally to



a, and is, as above said, sometimes turbid after heavy rains. Both waters, however, may be taken on board without

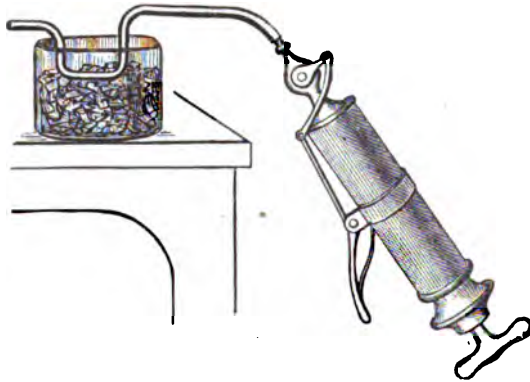
any injury to the health of the ship's company at Constantinople was not the case at Smyrna. Rains were frequent, the dampness of the climate conducing to an increase in rheumatic and neuralgic affections. Small-pox may be said to be endemic in Pera, and a case (in a colored man) occurred on board the Alliance. This was readily received by the German hospital under the direction of the Deaconesses of Kaiserswerth, after having been treated at the British Seaman's Hospital. The latter is that which has taken advantage of by American men-of-war, being well supplied with food, neatly kept and well managed, under the professional supervision of an English surgeon, Dr. Patterson. But for the difference presented by the language, however, I should prefer the German hospital as larger and better situated (in the highest part of the city), and also on account of the excellent training of the Kaiserswerth Sisters. There is a good hospital connected with the French embassy, and a Turkish naval hospital which is open to foreign sailors.

There are no reliable statistics as to the hygienic condition of Constantinople and Pera. The steepness of the hills on which the city is built insures pretty effectual drainage, rain being quite frequent. Little or nothing is done by the authorities on behalf of the public health, which is, nevertheless, not remarkable. Small-pox is always present, sometimes epidemic; diseases and affections of the eye very common; fevers frequently take on a typhoid form. There was no epidemic raging at the time of our visit.

The Alliance sailed from Constantinople December 8, and made a short stop at Mitylene, anchored at Smyrna December 15, and remained in the latter port throughout the rest of the year.

## MEMORANDUM OF A PARTIAL EXAMINATION OF THE IMPURITIES IN THE AIR ON BOARD THE ALLIANCE.

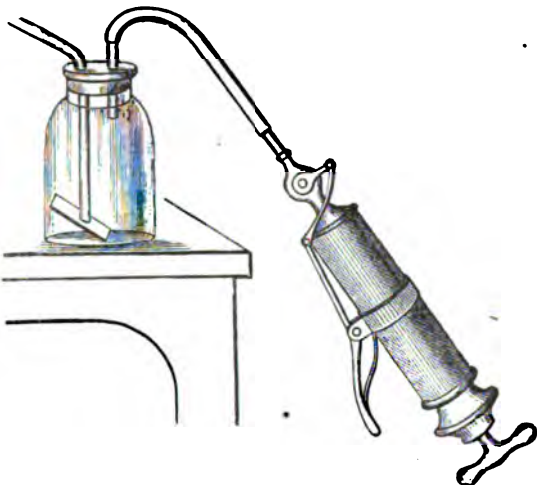
1 *a. Suspended matters.*—One of the small glass tubes in the test-case is bent twice upon itself in a spirit-lamp flame and the curved portion immersed in a mixture of ice and salt. One end is attached by a rubber tube to the syringe of the stomach-pump, which has a capacity (on this ship) of 3.456 cubic inches.



Air is then drawn slowly through the tube by means of the syringe, until a perceptible drop of condensed water appears in the curve of the tube in the freezing-mixture. This drop is placed upon a microscope-slide and examined with the highest power available, for the suspended impurities which are carried down by the watery vapor in condensing. A drop of water thus condensed from the air of the sick-bay of the Alliance, in the forenoon, and examined with a Wales  $\frac{1}{2}$  objective (about 300 diameters), showed epithelium, cotton and wool fibres, and fine amorphous particles not identified. No spores or organic cells large enough to be recognized under this low power were found.

*b.* A large supply of solid particles may be obtained by attaching the syringe to the shorter tube of a wash-bottle and

g a glass slide smeared with pure glycerine so that the air shall strike upon it.

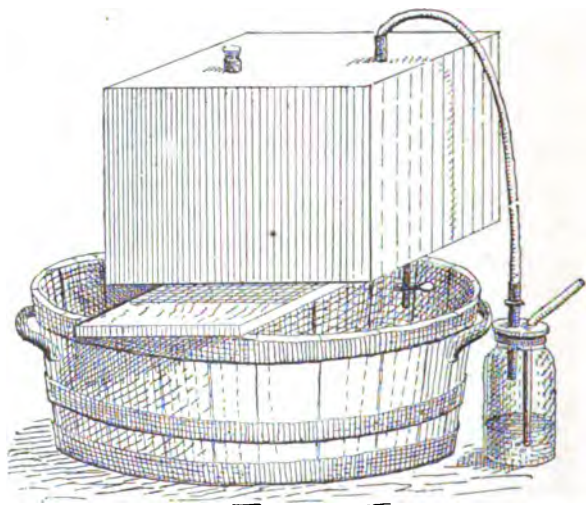


drawing the air through the bottle by means of the a considerable quantity of solid matter can be in this obtained. The air of one of the cells occupied by a was found to be charged with epithelial scales in large cotton, wool, and hemp fibres, particles of hard bread, and amorphous particles similar to those found by con- a, but no indication of cryptogamic growth was recog-

very easy mode of procuring a good supply of solid mat- the air is to simply leave a slide smeared with glycer- quiet place in the part of the ship to be examined, for our hours. In this way, however, much solid matter ted upon the slide which cannot properly be called ded"; small particles of coal and woody fibre, starch tobacco, etc., for example.

*Carbon dioxide*.—Pettenhoffer's method of determining the on of this gas present in the air, as described by

Parkes, is readily available on shipboard, and may be much improved, as I think, by an extemporized aspirator and the use of a wash-bottle. One of the paymaster's coffee-tins makes a very good aspirator, and can easily be soldered up and fitted with the necessary openings by the engineer's force. The apparatus as used on board the Alliance is shown in the accompanying sketch.



The large tube on the upper surface is for filling the vessel and is closed with a cork; the smaller one is fitted to the shorter gutta-percha tube in the stomach-pump case, the other end being connected to the short tube of the bottle. The latter contains 60 cubic centimetres of lime-water, the strength of which (in lime) has been previously ascertained by titration with a standard solution of oxalic acid (2.25 grammes to the litre), and beneath which dips the longer, bent glass tube for the admission of the air. At the bottom of the tin box which does duty as an aspirator is a third opening, fitted with a short piece of rubber tubing and closed by the pinch-cock from the



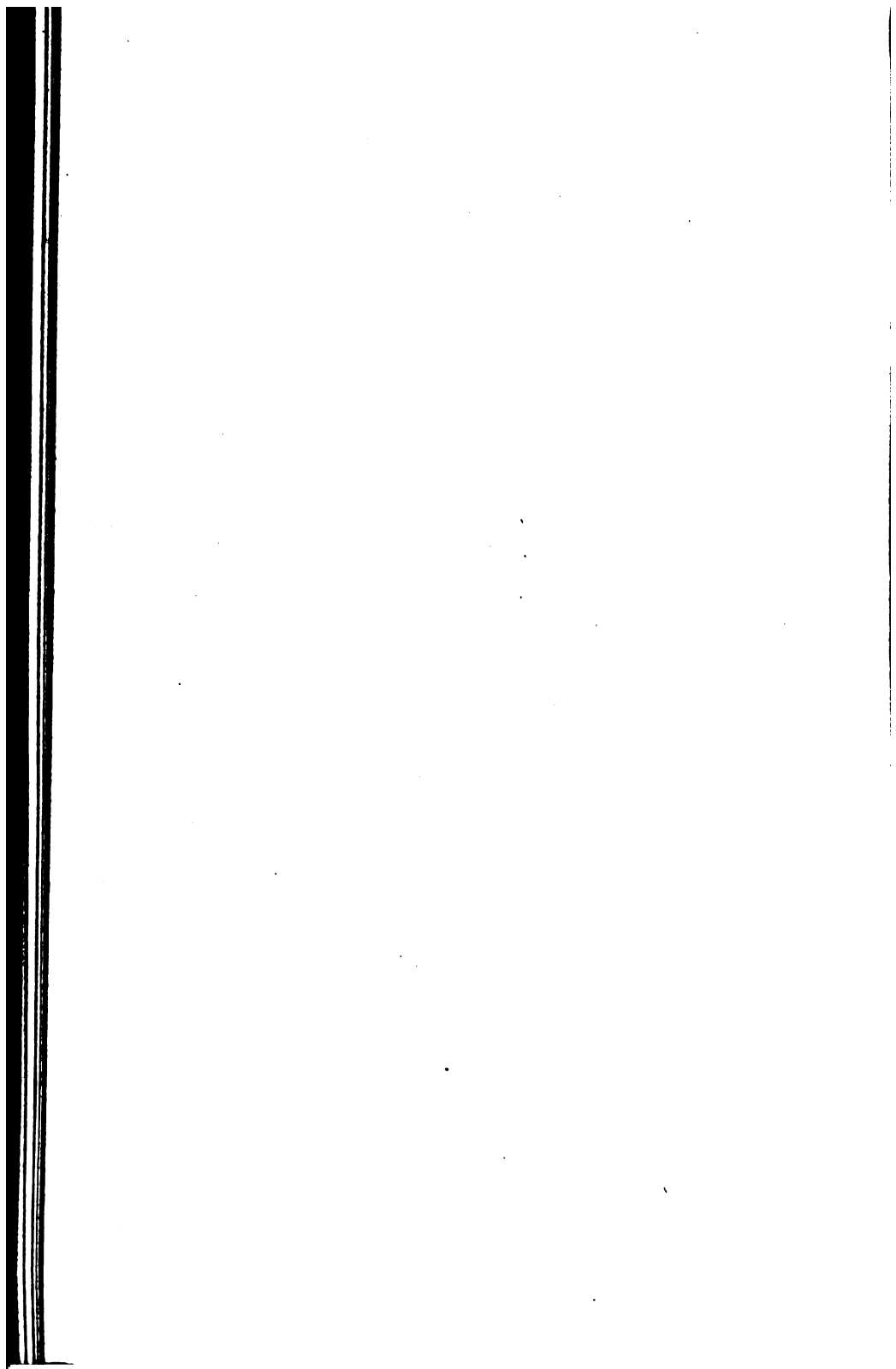
e. The cubical contents of the aspirator is readily ascertained by filling it with water and noting how much it holds. The aspirator now in use on this ship contains  $14\frac{1}{4}$  gallons, or 54 cubic inches, which is nearly 54 litres.

To make an estimation of the air upon the berth-deck, for example, set the aspirator upon a division-tub in the place sealed with water, connect the bottle containing 60 cubic centimetres with the smaller of the upper openings, open the stop-cock and allow the aspirator to empty itself. An amount of air exactly equal to its cubical contents must pass through the lime-water, where its carbonic acid is left behind, in combination with the lime. Upon titration after the experiment a less amount of standard solution of oxalic acid will be required to neutralize the lime-water than before, and the difference between these two quantities, expressed in cubic centimetres, and multiplied by .79 (Parkes' Hygiene, 1873, p. 169), will give the amount of cubic centimetres of carbon dioxide contained in the volume of air passed through the lime-water. The water should be allowed to run from the aspirator very slowly, lest some of the carbon dioxide pass through the lime-water uncombined, and great care is necessary to guard against small leaks at the joints. The aspirator that I have is much too large to be easily manageable, and another is being constructed by the ship's force, which will hold as nearly as possible one cubic foot of air. Several observations have been made with the aspirator as described, in different parts of this ship and at different times. All of them seem to me to show too small a quantity of carbon dioxide, ranging from 0.3 parts per thousand in the fore-hatch on the berth-deck, to 0.9 parts per thousand in the sick-bay at 2 a. m., no windsails being down, and 1.2 parts per thousand on the after part of the berth-deck before the hands are turned to in the morning. The estimation of carbon dioxide is so generally accepted as a fair index to the

impurities in air likely to follow defective ventilation and overcrowding, and the difficulties in the way of estimating nitrogen and organic matters on shipboard are so formidable that it seems to me hardly practicable to carry eudiometric observations farther than this, excepting in a qualitative way. Ozone, organic matter, and sulphuretted hydrogen may thus be shown to be always (or nearly so) present on shipboard, but the information would seem to be of but little value to the study of hygiene. Considering the difficulties and discouragements presented by the conditions of naval life to the prosecution of such researches, I would respectfully suggest the propriety of furnishing every ship from which such reports are expected with all of the apparatus which the Bureau decides to be requisite, a set of metric weights, and a good litre and 100 cubic centimetre-measure, and the necessary chemicals, the test-case being supplied only occasionally, upon special requisition. I take the liberty of inclosing a list of the articles which I found useful and which were not supplied to the ship.

[NOTE.—The articles referred to are now included in the naval allowance.—J. B. P.]

**ORTH PACIFIC STATION.**  
**1877.**





## BERTH PACIFIC STATION.

U. S. S. LACKAWANNA.

REPORT OF SURGEON ARCHIBALD C. RHOADES.

present complement of the United States ship Lackawanna 17 officers and men, but that number has never been since I joined her in August, 1877.

There were two deaths—one from fracture through the base of the skull, the other from angina pectoris.

Water used has been that supplied by the distilling apparatus; it is very pure, well aerated, and palatable, the quantity sufficient for all necessary purposes. The food at sea the crew was the ordinary Navy ration; while in port provisions were issued about four times a week. The quantity of food, its quality was good, and as a rule it was well cooked.

I think canned tomatoes would be a useful addition to the provisions.

Provisions should be removed from the berth-deck and put in the fore-castle, which could be extended aft if necessary; it would be advisable to have steam-coils on the berth-deck for drying and drying it.

The sick-bay is on the forward part of the berth-deck; it is high, and pretty well ventilated by two air-ports and a small steam-coil is required for drying the deck and for heating the water for a bath. The lighting is defective, I do not see how it can be improved while the sick-bay is in the place now set apart for it.

Locker-closets for the crew are entirely open to wind and the plan should be devised for covering these, and to protect the men from the great risk to health which they

now run when using them in cold or stormy weather. The bilges of this ship have been kept very clean, and no disagreeable odor from them has been observed.

The crew were well cared for, everything possible being done to promote their health and comfort, while suggestions made by the medical officers concerning the sanitary arrangements of the ship have been kindly received, and, when practicable, carried out.

On the 26th of August, 1877, the Lackawanna started on a cruise, going first to Nee-ah Bay, Washington Territory, where there is a reservation for the Makah tribe of Indians, who number about 500 souls. These Indians live comfortably on the products of their seal and other fisheries, and are seemingly well contented with their condition. Venereal disease is not common among the Makahs, although their medicine-men ascribe almost every sore, no matter how simple its nature, to syphilis.

The climate being cold and humid, there is a good deal of rheumatism among them, and heart disease as a sequel is quite frequent. In 1852 an epidemic of small-pox decimated the Makahs, but the disease has not returned since, and the tribe is now slowly increasing. The health of these Indians is generally good, although there are many cases of skin disease, caused, probably, by their dirty habits and the crowded condition of their houses. *Polypodium falcatum*, or sweet liquorice fern, which grows here, is used by the Indians in the form of a decoction, and is thought to have properties similar to sarsaparilla.

From Nee-ah Bay the Lackawanna went to Port Townsend, W. T., arriving there on the 16th of September. The weather at Port Townsend was good, and the health of the crew, both during this visit and our longer stay in October, was excellent. The hottest month is August, and the coldest, February, the

ference being only 20° Fah.; the diurnal variations of temperature also are small. The temperature of the whole western coast of America is modified and made remarkable by the Japanese current, which, striking Alaska, runs as far as California close to the land. The coast of Oregon Territory has a genial climate, with a great deal of rain in the winter and spring.

At Townsend there is a marine hospital under the management of Dr. T. T. Minor, which has accommodations for 75 patients. It consists of a main building 100 by 28 feet, having wards, and rooms for private patients, dispensary, and two smaller detached buildings, one of which is used for the sick, and the other for kitchen, laundry, and store-rooms. The water-closets are separated from the wards, and are well ventilated. The hospital is complete in all its appointments, and is very clean, and kept in good order.

At Port Townsend the Lackawanna went to Departure Bay, where there are several mines of bituminous coal; of this we laid in a supply which was used during the remainder of the cruise. The following is an analysis as given by the chemist: Carbon, 66.93; hydrogen, 5.32; nitrogen, 1.02; oxygen, 8.70; ash, 15.83.

At Departure Bay we went to Esquimalt Harbor, Vancouver Island, which is two miles west of Victoria Harbor. Esquimalt is a station for the British naval forces in the Pacific, and here there is a hospital for the use of the fleet; it is under the charge of Surgeon Matthew Coates, R. N., through whose courtesy I had an opportunity to inspect it. The hospital is on an elevation, and receives the full benefit of the prevailing winds. It is a wooden structure, well lighted, but not over-ventilated, and has beds for 30 patients in the wards; there is also a small detached building for the treatment of infectious disease. The surgeon's house is about

100 feet from the hospital proper, and in addition to his own quarters there are rooms for the accommodation of four sick officers.

We returned to San Francisco early in November, 1877, staying off that city until the 1st of December, when we went to the anchorage off the navy-yard, Mare Island, where we remained until the ship went out of commission, January 23, 1878.

I enclose report of Assistant Surgeon E. M. Martin on the medical topography of Mazatlan, Mexico.

#### U. S. S. LACKAWANNA.

##### REPORT OF ASSISTANT SURGEON EDWIN M. MARTIN.

##### MAZATLAN.

Mazatlan, situated in latitude  $23^{\circ} 11' 40''$  north, longitude  $106^{\circ} 23' 45''$  west, is the most important town on the western coast of Mexico, and has about ten thousand inhabitants. It receives a large number of imports, chiefly from England, for the supply of the interior, and is the outlet for the products of the rich mining district of San Sebastian.

The town stands on the eastern side of the bay which forms its harbor, on a tract of elevated and somewhat rolling ground, the soil of which is a sandy loam. South of the town an arm of the sea extends towards the interior, and north of this estuary is an extensive tract of low, marshy land, intersected by numerous lakes and lagoons, and covered in many places with extensive mangrove jungles. Mazatlan is thus bounded on the north and east by extensive marshes, generating malarial poison, which, during the prevalence of certain winds, is swept into the town, causing the various forms of malarial disease so commonly met with there.

The town has a general air of cleanliness and neatness. The streets are wide, and, although there is no system of sewerage

kept scrupulously clean by means of strict municipal regulations. The houses are low, light colored, and built in the old style of architecture, those owned by the better class of residents being commodious and well ventilated.

Water is supplied with water from cisterns and wells. The water is of excellent quality; but the well-water, which is obtained from shallow wells dug in the alluvial soil near the shore, is not so good. It is simply the sea-water partially purified by filtration through sand, and at times contains a large amount of sodium chloride.

In other places in this part of the world, Mazatlan has but two seasons, namely, the wet and dry—the former lasting from May to November, and the latter the remainder of the year. The highest temperature reached at Mazatlan is 105° Fah., and the lowest is 58°; but the average annual range is only 17°. During the wet season the average monthly temperature is 85° 54', the daily range being 8°. During the dry season the average monthly temperature is 77°, with a daily range of 9°. The average annual rainfall is 130 inches—nearly the whole of it falling in the wet season. During our stay the maximum humidity of the atmosphere was 94 per cent. of saturation; the minimum was 70 per cent., and the daily average 87 per cent. At the same time the maximum pressure as shown by the barometer was 30.17 inches; the minimum was 29.94 inches, and the average 30.05 inches. In the dry season the prevailing winds during the day are from the northwest, giving rise to light to light land-breezes. In the wet season the prevailing winds are from the south and southwest.

The medical faculty of Mazatlan consists of one American and two Mexican doctors. To practice here, as in other parts of Mexico, it is necessary to pass an examination in Guadalajara or the city of Mexico; and in addition to the regular medical education, a knowledge of French and Spanish is required.

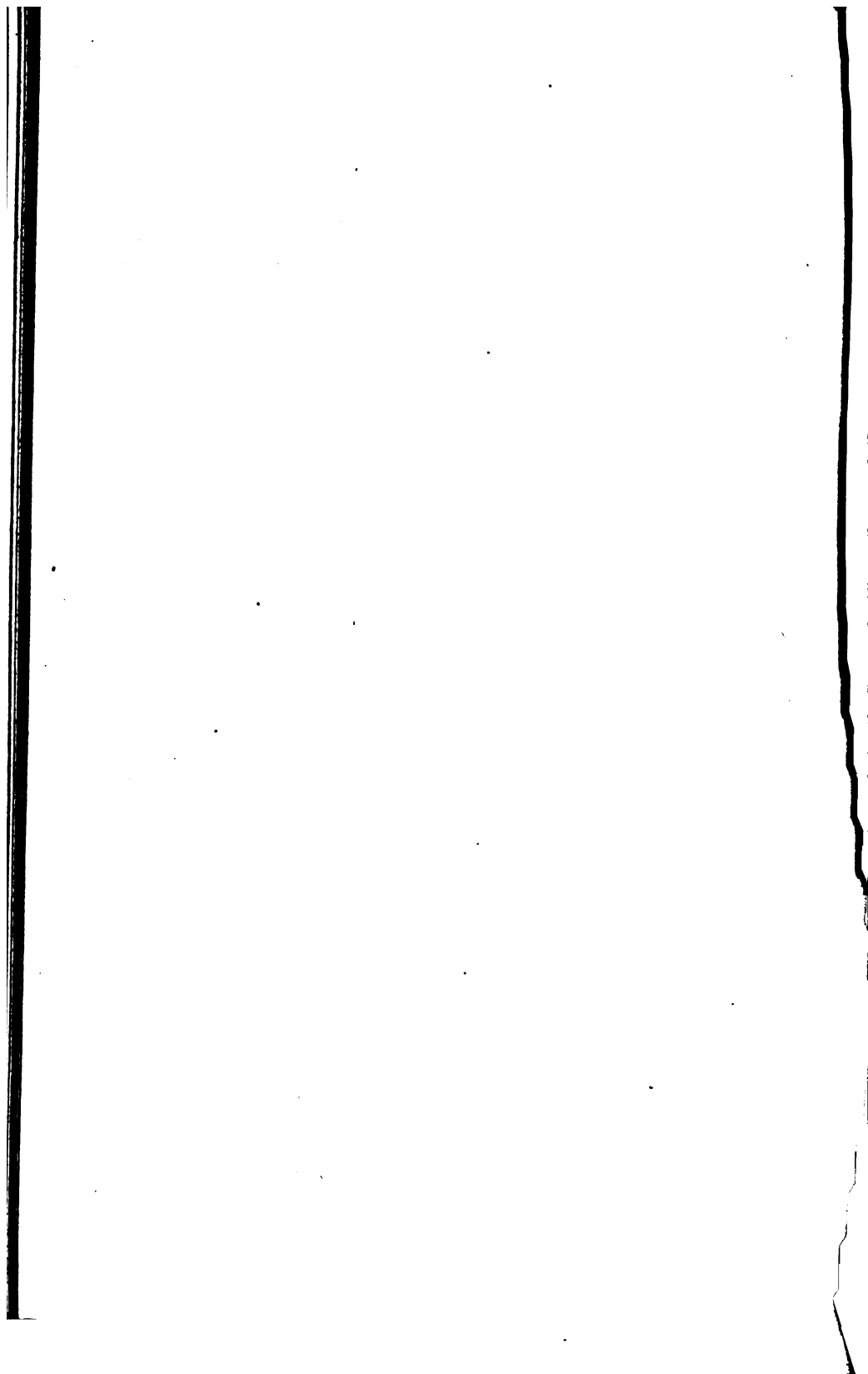
I was unable to obtain any accurate health statistics; but the place has always been remarkably healthy, and the climate is found to be well adapted to persons affected with pulmonary complaints. The diseases met with most frequently are malarial and syphilitic. There is an affection common in the southern part of Mexico known as the Mal del Pinto; it is probably a variety of pellagra.

Leprosy is widespread throughout Mexico; but it is most abundant in the States of Mexico and Sonora. It occurs in the tubercular and anæsthetic forms; but the macular, which is regarded by most or all writers as a primary stage of the affection, exists in the above-mentioned States as a distinct disease.

Mazatlan supports one hospital. The site of the building is not so elevated as might be desired, but I can speak in other respects favorably. It is a stone structure, one story high, and contains three wards. The main ward is 70 feet long by 20 feet wide, and has 22 beds. The two remaining wards are each 60 feet long by 20 feet wide, and have 20 beds each. In all three wards the proportion of window-space is one to three of the wall-space; and every ward contains 80 ventilators, each three inches in diameter, placed in the walls near the ceiling and floor. There are no water-closets or lavatories in the hospital building. Patients take their meals in the wards. The medical staff consists of a visiting physician, an apothecary, and nurses. I was unable to obtain any hospital reports. There were 20 patients in the hospital at the time of my visit. The majority of cases treated are malarial, syphilitic, or surgical.



OUTH PACIFIC STATION.





## SOUTH PACIFIC STATION.

### U. S. FLAG-SHIP OMAHA.

#### REPORT OF SURGEON GEORGE R. BRUSH.

The number of men and officers on board, 250. Percent-sickness, 4.52. Percentage of deaths, 0. Seventeen were invalided.

Water has been partly distilled and partly obtained from the sea. The latter source at Guayaquil and at Callao when the water was doubtful from defects in the apparatus for distillation.

The naval Navy ration has been very satisfactory. Fresh vegetables were issued for 169 days. The bread purchased at the station, although very good, has not been equal in keeping properties to that furnished at Panama, New York, by the Bureau of Provisions and Clothing.

Laundry has been generally of the kind furnished by the Government. Under-shirts have been purchased from other sources. A large proportion of the men, which in warm weather is more comfortable than those of blue flannel drawn from the

During the last one hundred and twenty-five days of the year were in the Bay of Panama, and the remainder in active cruising with short stoppages in several ports, passing as far south as Valparaiso.

In the early part of the year considerable apprehension was felt at Callao and Lima in consequence of a report that several cases of yellow fever had occurred, and because of the prevalence of malarial fever which often assumed a pernicious type. The

prevalence of this disease was probably due to an unusually warm season, and to the relaying of a large number of streets in both cities with a decomposed rock, known as "Oroya cement."

Yellow fever appears to have been first known on the west coast of South America, at Guayaquil, in September, 1841, having been imported from Panama by the schooner *Queen Victoria*. This epidemic, I am informed by Dr. Destrange, was very fatal, continued for three years, and was finally extinguished by excluding persons from the surrounding country, to which class the disease had become confined.

Callao and Lima suffered severely from this disease in 1854, and again in 1868, both epidemics arising from importation from Panama. The epidemic of 1868 extended as far south as Arica, latitude  $18^{\circ} 30'$ , and was also developed at Tacna, forty miles in the interior, and connected by railroad with Arica.

With the establishment of steam communication via the Strait of Magellan, it is not improbable that it may eventually be imported from this direction, and finally become endemic at some points on this, as it has already become at some points on the eastern coast.

Small-pox has been and continues to be epidemic at Valparaiso and at some other places in Chili. Early in the year this ship's company were revaccinated with virus supplied from the laboratory at Brooklyn, N. Y., with the result of seven cases of partial success in about two hundred revaccinations.

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When at Iquique, Peru, in August, 1877, an opportunity occurred to visit La Noria, a town of a few hundred inhabitants, situated about thirty-five miles from the coast by railroad, in the southern part of the well-known "salitre" district, in the province of Tarapaca. The presence of iodine in this mineral

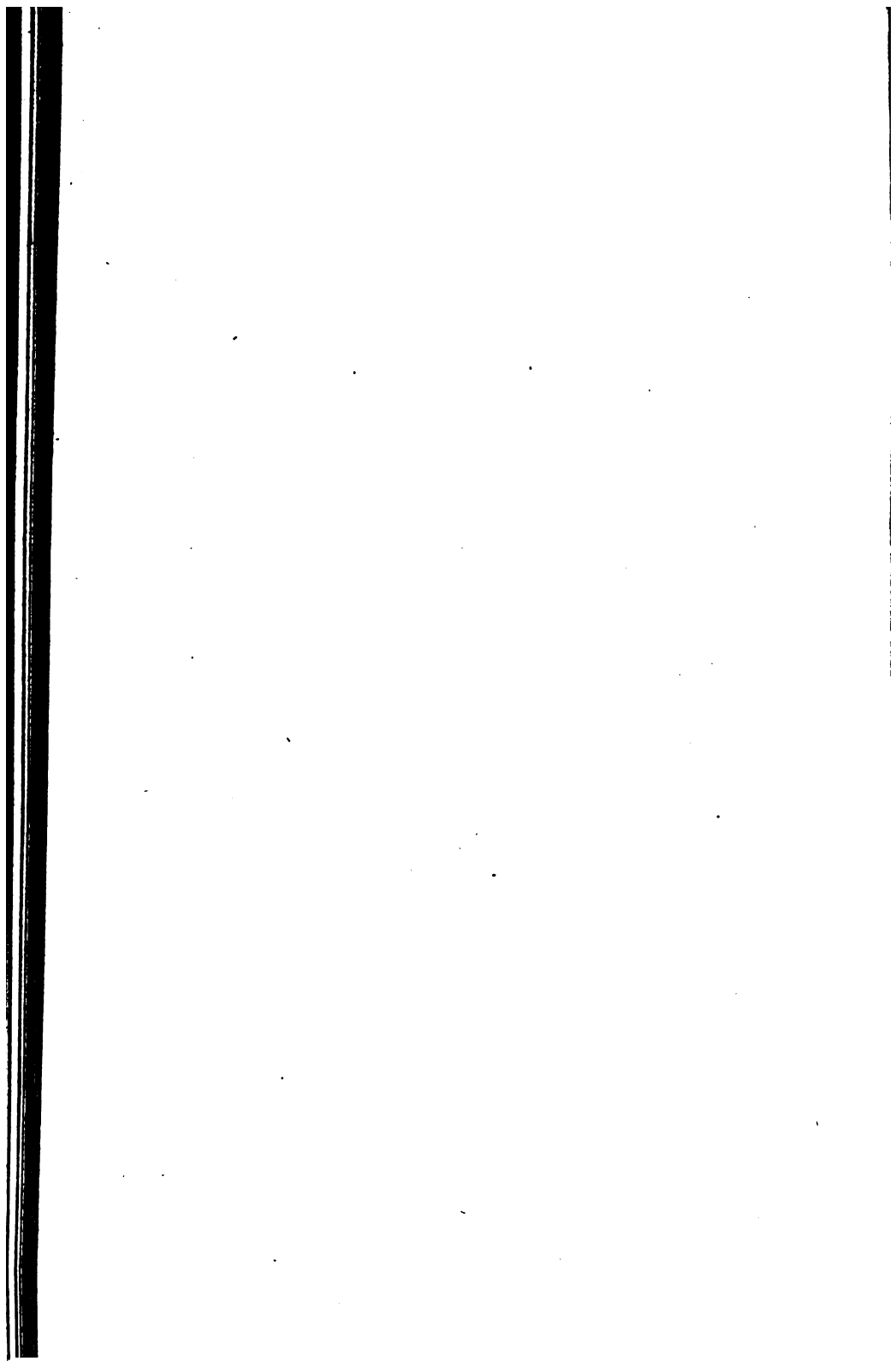
nitrate) has been recognized before, but it is only that it has been separated in sufficient quantity to be of commercial importance. It is obtained from the mother-liquor which the impure nitrate has been dissolved for recrystallization, and is probably associated with this substance as potassium iodide. It may also exist in the very saline mineral obtained in this locality at a depth of 250 feet, which is used as a solvent.

A factory in 1876 produced 900 quintals, and as there are several other factories the total production must be considerable, but I am not aware of its being mentioned as an article of export from Peru. It is packed in thick oaken kegs, covered with cow-hide and varnished.

The district is generally about 3,500 feet above the sea-level. The climate is extremely arid. The thermometer frequently rises to 100° during the day and falls below the freezing-point at night. Violent winds with storms of dust are not uncommon. The snow-covered peaks of the Andes are seen to the eastward from which small streams fall and flow toward the Pacific but are soon lost in the desert. Occasionally (it is said once in seven years) these streams reach beyond their usual limits and form temporary lakes on the usually arid



ASIATIC STATION.



## ASIATIC STATION.

### U. S. FLAG-SHIP TENNESSEE.

OF PASSED ASSISTANT SURGEON BENJAMIN S. MACKIE.

It remains to be noted concerning the hygienic condition of the ship that has not been fully reported by Medical Inspector Warner. During the last eight months the berth and gun platforms have been less frequently wet, with the effect of considerably reducing the relative humidity, but a still further improvement is to be hoped for. This can only be attained by opening the berth-deck. The bilge-ventilators which formerly opened on the berth-deck have all been closed and the ventilation has been improved by the removal of the boards, which previously shut out so much air, and the substitution of a net-work of small iron bars.

The ship remained at Yokohama eight months, with the exception of a trip of about two weeks to Hakodadi. During the year the health of the ship's company was unusually good, which is attributable to the fine and healthy climate of Yokohama. During the latter portion of the spring and the whole of the summer, irregular and often violent forms of malarial fever prevailed on shore, but this influence did not extend to the ship, as few cases appear on the journal for the period. In September and the succeeding months the fever began to affect the crew, and during the last quarter there were more cases of intermittent and remittent fevers than had occurred during any previous quarter of the cruise. There were many cases of neuralgia, anæmia, and various other manifestations of the action of malarial poisoning.

The weather during the summer was pleasant, and the heat not excessive, the thermometer rarely registering 90° Fah.

About the middle of September cases of cholera began to be reported on shore, and, as the disease showed unmistakable signs of becoming epidemic, it was deemed advisable to take the ship to Hakodadi. Soon after her arrival at the latter place the disease was brought there by an army-transport ship from Yokohama. By this time it was ascertained that Asiatic cholera was more or less prevalent at all the Japanese and Chinese open ports. Under these circumstances, Yokohama was as safe as any other port to which the ship could go, and she returned. After her arrival a strict quarantine was enforced on board. Carbolic acid, sulphate of iron, and chloride of lime, as well as sulphurous acid in solution were used for disinfecting the bilges and water-closets. The officers were instructed to avoid visiting the districts where the disease was prevalent. The epidemic lasted in Yokohama about two months, during which time there were over six hundred deaths from the disease reported. The death-rate was something over 50 per cent. of those attacked. I am happy to be able to report that no case of cholera epidemica occurred among the crew of the Tennessee.

On shore the foreign physicians were very active in their endeavors to bring about as perfect a hygienic condition as was possible, and the Japanese officials deserve the highest praise for the energetic manner in which they aided them. All drains, sewers, cesspools, and water-closets were thoroughly cleaned and disinfected, and as soon as cases of the disease occurred they were removed to special hospitals for treatment. The house of the sufferer was disinfected, all his clothing and mats were destroyed, and in case of death his body was burned. Under no other form of government could this system have



carried out so effectually. The government amply remunerated those who suffered from the loss of their effects. During the early part of the epidemic a German and a French doctor gave liberty to their men, and, in consequence, the German lost one man and the Frenchman several.

As the weather grew cooler with the advance of the season, the disease diminished, and finally disappeared about the latter end of November. It was originally brought to Yokohama by a ship coming from Nagasaki and Kagoshima by steamer, and was confined almost altogether to the native population, as there were only five or six deaths among the foreign residents. After the cessation of the epidemic liberty was granted to the men without evil consequences. The ship left Yokohama on November 4, and, after a short stay at Kobe and Nagasaki, reached Shanghai on the 20th of December.

Deaths, or number of persons sick during the year, 1,475. There were no deaths on board, although one of the crew died of obstruction of the bowels at the Naval Hospital at Yokohama, Japan.

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#### U. S. S. MONOCAHY.

REPORT OF ASSISTANT SURGEON PHILLIPS A. LOVERING.

During the past year this vessel has been constantly employed at the Asiatic Station, and has visited nearly all the ports open to foreign commerce, from Hakodate in the north to Hong-Kong in the south, and has also spent several months in the Yang-tse River.

With scarcely an exception, no vessel in the Navy has been in continuous service as long as the Monocacy; for, going into commission in May, 1866, and starting at once for this station, she has ever since been constantly in the Asiatic waters.

The number of men is 136; that of the officers varies, but will

average 14, comprising one cabin, 10 wardroom, and 3 steerage officers, making a total of 150. The cubic air-space allowed each individual is as follows:

	Cubic feet.
Cabin.....	2,320
Wardroom.....	650
Steerage.....	250
Berth-deck.....	108

The actual air-space that each man on the berth-deck has had during the past year is considerably more than 108 cubic feet, for the complement has never been full, averaging for the year only 110 men, thus increasing the air-space to 130 cubic feet per man. In time of war, with a full complement of 175 men, the air-space would be reduced to 83 cubic feet per man.

There have been no deaths on board during the past year, and the health of the crew has been fair. For though the amount of sickness has been considerable, there have been but few serious cases.

The total number of sick-days during the year has been 1,358:

First quarter.....	170
Second quarter.....	358
Third quarter.....	481
Fourth quarter.....	349

making an average of  $3\frac{2}{3}\frac{1}{3}$ , or 3.72.

As the number of men and officers has averaged 124, this makes nearly 11 (10.95) days for every one aboard.

The total number of admissions to the sick-list during the year has been 116, and there were 3 remaining on the list at the commencement of the year. Taking, then, 119 as the total number on the list during the year, it makes the average sick time of each man admitted, 11.23 days.

In the absence of any epidemic on board ship, or of any unusual amount of disease which can be referred to climatic influences, I have thought it well to analyze the different affections,

adopting mainly the regular classification, have obtained the following results:

*Febrile diseases* account for 38 sick-days, or 2.79 per cent.

The whole number of sick-days, nearly equally divided between *febris intermittens* and *febricula*.

*Genital diseases*, under which I have included not only syphilis and gonorrhœa, but also those affections strictly due to gonorrhea, as stricture, orchitis, and adenitis, account for 259 sick-days, or 19.07 per cent. of the whole number.

*Neurotic diseases* account for 4 days, or less than 1 per cent.

*Muscular diseases* account for 83 sick-days, or 5.37 per cent.; of this number 18 days are due to *adynamia* and 65 to *rheumatismus chronicus*.

*Diseases of the nervous system* account for 27 sick-days, or 1.98 per cent. of the whole.

*Diseases of the eye* and *diseases of the ear* each account for less than 1 per cent. of the whole number.

*Diseases of the respiratory system* account for 46 sick-days, or 3.46 per cent. of the whole number. Of that number 22 days are due to *bronchitis chronica*, 21 to *bronchitis acuta*, and 3 to *tracheitis acuta*.

*Diseases of the digestive system* account for 352 sick-days, 25.84 per cent. of the whole number, which are divided as follows:

<i>Enteritis morbus</i> .....	4
<i>Enteritis</i> .....	7
<i>Colitis acuta</i> .....	154
<i>Colitis chronica</i> .....	9
<i>Enteritis acuta</i> .....	130
<i>Enteritis</i> .....	13
<i>Rhinitis</i> .....	4
<i>Stomatitis acuta</i> .....	23
<i>Stomatitis</i> .....	8
Total .....	352

It will be seen at a glance that diarrhœa acuta and dysenteria acuta account for over three-fourths of the sick-days due to diseases of the digestive system.

*Diseases of the urinary and genital systems*, excluding those due to syphilis and gonorrhœa, account for 27 sick-days, 1.98 per cent. of the whole number. Of that number 1 day was due to albuminuria and 26 to orchitis, the latter disease caused by an injury, but aggravated by syphilis.

*Diseases of the integumentary system*, excluding one case of adenitis due to syphilis, account for 269 sick-days, or 19.80 per cent. of the whole, divided as follows:

Abscessus .....	9
Adenitis .....	214
Eczema .....	39
Furunculus .....	7
Total .....	269

Nearly four-fifths is due to adenitis, more than to any other single disease in the classification. I am unable to explain this large amount of glandular disease, the greater part of it being idiopathic, and not due, as far as could be ascertained, to any previous injury or disease. The inguinal glands were those most usually involved, and the course of the affection has been tedious, obstinately resisting all treatment, both local and internal, but gradually disappearing without suppuration.

*Wounds and injuries* account for 249 sick-days, or 18.40 per cent. of the whole number.

Grouping together the above results, I obtain the following table, which shows the percentage of the time lost through sickness, arranged according to the orders of the classification:

Miasmatic diseases .....	2.78
Enthetic diseases .....	19.07
Diathetic diseases .....	5.37

ASIATIC STATION.

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Diseases of the nervous system .....	1.98
Diseases of the respiratory system .....	3.37
Diseases of the digestive system .....	25.84
Diseases of the urinary system .....	1.98
Diseases of the integumentary system .....	19.80
Wounds and injuries .....	18.40
Minor affections .....	1.41
Total .....	100.00

In order to find out, more clearly than the above table shows, the number of sick-days due to diseases occasioned by climatic influences, I have analyzed the diseases of the digestive system, and, adding them to the miasmatic diseases, obtain the following result:

	Sick-days.
Febris intermittens .....	17
Febricula .....	21
Diarrhœa acuta .....	19
Diarrhœa chronica .....	9
Dysentery acuta .....	130
Hepatitis acuta .....	23
Total .....	219

or a fraction over 16 per cent. of the whole number.

Venereal diseases, including both gonorrhœa and syphilis, account for nearly one-fifth, 19.07 per cent., of the whole time lost through sickness. In some of the cases of syphilis I have had the opportunity of watching the progress of the disease from the primary sore, and both in these cases, and in those seen only in the secondary and tertiary stages, have been forcibly impressed with the severity of the disease and the stubbornness with which it resists treatment. I think that the syphilitic virus works more powerfully and lasts for a longer time than it generally does in the United States. In this opinion I have been sustained by the testimony of several physicians I have met who have treated the disease both in Asia

and America. The forms in which the disease has manifested itself aboard this vessel have chiefly been those of the late secondary and early tertiary stages, affecting principally the skin and mucous membranes.

Though the hard chancre appears to be severe, quite the reverse is the case with the soft chancre and gonorrhœa. Both these affections are usually mild and yield readily to treatment. Although there have been a large number of cases of soft chancre, in not a single one have I seen a suppurating bubo. In gonorrhœa, too, orchitis has been infrequent, and gonorrhœal rheumatism has been unknown.

I have already mentioned the great frequency of diseases of the glandular structures, and the persistence with which they resisted treatment. I cannot help thinking that in some cases they were due to a venereal poison, or at least aggravated by it, for they were benefited more by mercury and iodide of potassium than by other remedies. The efficacy of these medicines is well known in glandular affections in which no syphilitic history can be traced.

Wounds and injuries have been quite frequent, but as a rule trifling. There have been no fractures during the year, and but one dislocation, which was simple and easily reduced.

The ventilation of the vessel is described at length in the report of the Bureau published in 1875, and I will not enlarge upon it, but simply state the means of ventilating the different parts of the vessel.

The cabin has six dead-lights and two hatches. The ward-room has eight dead-lights and two half hatches. The steerages have each two dead-lights, and there is a large hatch opening into the country. The berth-deck has two large hatches and one small one, besides the dead-lights, twelve in number. The fire-room has two ventilators leading up to the hurricane-

deck, and a large hatch opening on the main deck. The engine-room has a large hatch opening on the hurricane-deck.

In port, when the dead-lights and hatches can be left open and win:sails are rigged, there is probably a sufficient supply of air to all parts of the ship, except possibly the berth-deck. At sea all the dead-lights have to be closed, and occasionally the hatches, in bad weather; consequently at such times the ventilation is quite poor in all parts of the vessel.

On the berth-deck at night, when the vessel is under way, the air is foul and close, and even in the wardroom, where the air-space is much larger and the ventilation equally as good, the air under the same conditions is quite oppressive. As this trouble only occurs when the vessel is under way, I think it might be avoided or remedied in great degree by the use of blowers, similar to those employed in the monitors. The amount of power which would be required to run such a blower is small. An ample supply of fresh air could be obtained from ventilators led up to the hurricane-deck, and a free exit for the foul air would be at hand through the numerous hatches, which are but rarely closed, or by permanent metallic ventilators, which could readily be made and fitted.

The bilges are always kept in excellent condition, thoroughly cleaned once a week, disinfected with a solution of carbolic acid, and whitewashed. It is rare that any offensive smell can be noticed, and I think it would be difficult to find a vessel whose bilges are cleaner and sweeter.

All parts of the vessel are well lighted by the numerous hatches and dead-lights, and are heated throughout by steam, leaving in these respects nothing to be desired.

The water used for drinking and cooking is distilled aboard ship, of excellent character, well aerated, and free from all impurities. The tanks contain 1,800 gallons, or about six days' supply, allowing two gallons for each man per diem. Though

the storage capacity for water is small, this is of less importance, as 2,400 gallons can be distilled in a day if required. Baird's aerator is employed and answers the purpose perfectly. After the water has been aerated it passes through animal charcoal. In this manner perfectly pure water is obtained, and so well aerated as to be very palatable.

At sea the usual Navy ration has been issued, and uniformly of good quality, all inferior articles being at once condemned by survey. When in port, as the vessel has been for the greater part of the year, fresh provisions have been issued on an average five days in the week. In the northern part of China and Japan the beef and vegetables have been of excellent quality. In the southern part of the station the meat has not been so good as that obtained further north, but still of very fair quality.

The clothing has been of the usual regulation pattern, but superior, if not in quality, certainly in fit and general appearance, to that usually seen. All the articles are made to order by native tailors. In this way the men obtain clothing which fits them, wears well, and cheaper in many cases than the same articles drawn from the paymaster.

On board this vessel I have seen in several instances the advantages that would ensue from the government giving a man on enlistment a complete outfit of clothing. In this vessel the majority of the men are enlisted at the different ports visited; many of them are destitute; few have a good outfit or sufficient money to buy one. They are advised to draw as few clothes as possible on enlistment, and with some reason, for no one can go on liberty who is in debt. If a man draws a full outfit he is virtually quarantined to the ship for a month; in the case of a landsman, for two or three months. Consequently they often have a very scanty supply of necessary articles, especially of underclothing, and perhaps even of bedding.



In several cases admitted to the sick-list during the past year, I have found their supply of clothing to be very meagre. In one case of dysentery, where the man was very sick, it was ascertained that he had been sleeping on deck and in the fire-room for an uncertain length of time, but probably for over a month, without any mattress. In another case of diarrhoea, which resisted treatment quite obstinately, I found that the man had no underclothing, and as the weather was damp and quite cool, I have no doubt that the lack of clothing aggravated the disease, for after he obtained the required articles his recovery was rapid. In one or two other cases I think the lack of sufficient clothing had some effect on the duration of the disease, and perhaps even the causation, though not in so marked a degree as in the two cited above.

On a station where a vessel is apt to pass in the course of a week or two from one extreme of temperature to the opposite, and where the range of temperature during the twenty-four hours is quite great, the need of proper clothing and bedding is apparent, and as it has forcibly impressed me, I have devoted perhaps an undue space to the subject.

*Medical topography.*—From January 1 to April 26 the Monocacy was in the Yang-tse River, visiting all the ports from the mouth to Ichang, 1,000 miles from the sea. During this time the health of the crew was unusually good, there being but an average of two men on the sick-list for a period of nearly four months, and but little of the sickness could be attributed to climatic influences. This was the more striking, as during the months of January and February there was a large quantity of rain and snow, and the weather was very damp. The months of March and April were mild and pleasant, and the trip, made to open the port of Ichang to foreign commerce, was unusually pleasant. We traversed a country comparatively new and differing in its natural features from the lower part of the

Yang-tse valley, being more uneven and rugged, though at the same time well cultivated and thickly settled.

In the late spring and early summer months the whole valley of this large river, for 800 miles from its mouth, is submerged to a greater or less extent, and in many places the country is covered with water for many miles on each side of the river. On the subsiding of the river in the latter part of summer a large amount of half-decayed vegetable and animal matter is left on the land, and it is soon rendered still more offensive and injurious by the great heat of the season. As might be expected, at this time malarial fevers and intestinal affections are prevalent and fatal. As the weather becomes cooler these affections diminish in frequency and severity, and from October till spring the country is healthy and pleasant.

Our stay at Shanghai lasted from April 27 to May 23. During this time there was an average sick-list of over three a day, and several of the affections were directly traceable to climatic causes, as there were several cases of dysentery, diarrhœa, and intermittent fever. While at Shanghai the vessel for over a week was in a dry-dock a short distance above the city. This dock is one of the most unhealthy places imaginable, being merely a huge hole dug out of alluvial soil and lined with decaying planks. All around is a low, level country, wet, and intersected with numerous canals, which are but little better than huge sewers. If to these conditions you add a hot sun shining with almost tropical heat on all the decaying matter, and a very moist atmosphere, you have many of the necessary factors of malarial fevers. Our stay at Shanghai after leaving the dock was short, and to this fact I attribute the good health of the crew after exposure to such unfavorable hygienic conditions. The Russian gunboat Sobol was in the same dock for several months during the spring and summer, and the health of her crew was very bad, from one-fifth to one-

third of the men being on the list at a time, from climatic affections, principally diarrhœa, dysentery, and intermittent fever. This large sick-list diminished rapidly when the Sobol left the dock and anchored in the stream a few miles further down.

Leaving Shanghai on the 27th of May, the vessel proceeded to Chefoo and remained there until June 2. This port is one of the healthiest places on the station, being an open harbor surrounded by a high, hilly country, the bay washed daily by strong tides, and the air purified by the fresh sea-breezes. Notwithstanding these favorable hygienic conditions, the health of the crew during our stay at Chefoo was poor, the sick-list averaging over seven a day. Much of the sickness was due to our stay at Shanghai, and was caused by the unhealthy conditions we were subjected to at that port. Almost all the affections under treatment were complicated with malaria, and required the use of quinine. Especially was this the case in several affected with bronchitis, diarrhœa, and adynamia, where the rapid results obtained from the use of this medicine could not be attributed solely to its tonic properties.

While the vessel was at Chefoo there was a severe epidemic prevailing among the Chinese, and many of them died daily. The foreigners, as a rule, were exempt from the disease, only one, the principal physician of the place, dying from it. I saw none of the cases myself, but was informed by a missionary physician who had a very large experience with the disease, that it was undoubtedly a species of typhus caused by the terrible famine which existed in the northern provinces of China during the winter of 1876-'77. Along the seaboard where provisions could be obtained from other places, the affection was not so severe, but further inland the ravages caused by it were fearful, whole villages and districts being depopulated.

Leaving Chefoo on the 2d of June we anchored at Tientsin on

the 4th, and remained there until the 5th of July. Although situated quite far north, in latitude  $39^{\circ}$ , the place is both the warmest and coldest of all the ports in China open to foreigners. During the summer the thermometer reaches  $110^{\circ}$  Fah., and even higher, while in the winter the river is ice-bound for months, and the mercury falls to zero. The city is seated on the banks of the Peiho River, 25 miles from the sea, is large and populous, and of considerable importance, being the seaport of Pekin. During the winter and spring the same typhus fever that I have mentioned above, prevailed with great severity, and even during our stay the mortality from it was so considerable that it was not advisable to permit any communication with the native city. Small-pox is endemic all the year round, and prevails with great severity during the winter months. All the unprotected persons on the Monocacy, including all who had not been vaccinated within a year, were vaccinated afresh. Aboard the English gunboat *Lapwing* there was a severe case of this disease, and later in the season one aboard the *Ashuelot*. Fortunately there were none on this vessel, which is to be attributed partly to the vaccination, but more probable to the strict quarantine regulations enforced.

The highest temperature reached was  $106^{\circ}$ , the thermometer being in the shade and exposed to a free current of air. The wet-bulb at the same time and in the same place recorded  $81^{\circ}$ , a difference of  $25^{\circ}$ . I am not aware that a greater difference between the dry and wet bulbs has been recorded, except in the desert regions of Africa. The same day the dry-bulb fell as low as  $64^{\circ}$  and the wet-bulb to  $58^{\circ}$ ; on two other days there was a difference of  $20^{\circ}$  between the two bulbs, the dry standing at  $98^{\circ}$  and the wet at  $78^{\circ}$ . In the above cases the difference was extreme, yet during our stay of 32 days, the average range between the maximum dry and maximum wet bulbs was  $10^{\circ}$ , and there was less than 60 per cent. of moisture in the air.

At night the difference between the two bulbs was not great, averaging only  $1^{\circ}.9$ . Owing to the great dryness of the air as well as to the fact that moderate breezes prevailed quite constantly, the heat was by no means so oppressive as might have been expected, and was borne with comparative impunity.

The health of the ship's company at Tientsin was fair; there was an average of 4.5 men on the list, and but few of the cases could be referred to climatic causes.

Leaving Tientsin on the 5th of July, the vessel returned to Chefoo and remained there until the 14th of August. The typhus fever which raged so severely during the early part of the year had disappeared entirely, and the health of the place was excellent. The health of the crew was fair, there being an average of five sick daily, but few from climatic diseases. There were a number of cases of intestinal affections, due almost entirely to indulgence in the fruits and vegetables so common at that season.

From Chefoo the vessel went to Nagasaki, and remained there from the 17th to the 28th of August. The place is quite healthy, the principal diseases being malarial fevers and bronchial affections. The prevalence of these affections is to be attributed in some measure to the extreme moisture of the place. The harbor is nearly landlocked, and is surrounded by high hills which catch and intercept the clouds, so that at some seasons of the year it rains almost daily. During the ten days we were there the maximum dry-bulb averaged  $85^{\circ}.5$  and the maximum wet-bulb  $84^{\circ}.2$ , the minimum dry-bulb  $75^{\circ}.9$  and minimum wet-bulb  $75^{\circ}$ . The duration of our stay was too short to afford any data as to the average temperature and humidity of the place.

From Nagasaki the vessel proceeded to Yokohama, and remained there until the 19th of September. On the 16th of the month the Asiatic cholera appeared in the city and continued to rage with considerable severity until the middle of Novem-

ber. In obedience to the orders of Capt. Jonathan Young, commanding United States naval force on the Asiatic Station, strict quarantine regulations were issued and carried out on board the vessel. All liberty was stopped; fresh vegetables, with the exception of potatoes, were not allowed on board; and extra measures of disinfection were employed. As the epidemic spread quite rapidly on shore, although no cases appeared either on the Tennessee or Monocacy, we sailed on the 19th of September for Hakodate, and reached there on the 23d.

That port on our arrival was free from epidemic disease, and remained so for nearly two weeks, when Asiatic cholera appeared, being without doubt imported from the southern part of the empire. During the epidemic, which lasted over two months, the health of the crew was very fair, averaging but a little over 4 sick a day. There were few cases of diarrhœa or other intestinal affections which are so apt to prevail during an epidemic of cholera.

The climate of the northern part of Japan, including the islands of Nippon and Yesso, is milder than the corresponding latitude in the eastern part of the United States, being moderated to some extent by the Black Stream, a warm current, somewhat resembling the Gulf Stream, that runs along the eastern coast of Japan. The diseases of this part of Japan closely resemble those of our temperate States. Malarial fevers are common, due perhaps to the numerous rice-fields which surround every place, and which are proverbially unhealthy the world over. The humidity of the climate may perhaps aid in the spread of these diseases; it is certainly a favorable factor.

During the summer and fall Asiatic cholera prevailed with considerable severity throughout almost all the countries included in the Asiatic Station. The origin of the epidemic is somewhat obscure, though probably it started in India, its na-

tive home, and gradually worked up the eastern coast of Asia, advancing from one port to another.

In Siam it raged, though not with great severity or large mortality. Passing by Hong-Kong it reached in early summer Amoy, and then in turn Foochow, Ningpo, Shanghai, and later the more northern ports of China, not extending far inland, but confined to the sea-coast and rivers. The disease was much more prevalent and fatal among the natives than among foreigners, comparatively few of the latter dying from the affection.

In Japan the cholera found a fertile field in the country around Kagoshima, a district devastated for months by civil war, where want prevailed among the people, together with neglect of sanitary laws among the large number of soldiers collected there. Here the cholera appeared in the latter part of August, when the war was nearly over, and the troops about returning to their homes in the different parts of the empire. Hand in hand with the dispersal of the troops, the disease spread over the whole country, first showing itself on the seaboard and gradually extending inland. In Hakodate, one of the healthiest ports in Japan, particularly fortunate in its healthy location and favorable hygienic surroundings, I had the opportunity to trace the outbreak of the disease. At this port there arrived in the latter part of September a steamer having on board a number of soldiers direct from the seat of war in southern Japan, where the cholera was raging. During the passage there had been several cases, and on arriving at Hakodate the sick, not more than six or eight in number, were removed to a hospital seated on the shore of the bay well outside the town. The majority of the sick soldiers, with some of the attendants, died; the survivors were quarantined and forbidden all communication with the town, and for several days no fresh cases of the disease appeared.

Despite all the precautions, several of the convalescents escaped and went to Hakodate. Two or three days after, on the 8th of October, less than a fortnight after the arrival and landing of the soldiers, several cases of cholera appeared in the city, and there were some fatal cases. From this time the disease spread through Hakodate, and raged for over a month, though not so severely as in the other ports of Japan.

I have seen no trustworthy history of the epidemic and have not had the opportunity of observing any cases of the disease. There can be no doubt, I think, that it was an epidemic of true Asiatic cholera. The symptoms were those that usually characterize the disease, and the mortality was great, averaging fully 50 per cent. of those affected. In one respect it differed in a marked degree from other epidemics of cholera. The number of persons attacked was comparatively small, only a small proportion of the whole population. The cause of this may perhaps be found in the excellent precautions and thorough sanitary measures which were undertaken and carried out by the Japanese authorities.

The Monocacy left Yokohama November 23, for Hong-Kong, stopping on the way at Kobe, Nagasaki, Shanghai, and Amoy, but staying in none of these places longer than three days. Arriving at Hong-Kong on the 20th of December, we remained there until the 29th, and then sailed for Siam.

Hong-Kong cannot be considered a healthy place, especially from the middle of spring to the middle of fall. During this time the climate is damp and the thermometer ranges high. There, too, the soil is composed of broken-down granite and clay, retaining water for a long time. From these causes the health of the place has always been bad, malarious fevers and intestinal affections being very prevalent, causing, both among the troops in garrison and the civil population, much sickness and considerable mortality.



## U. S. S. MONONGAHELA.

## REPORT OF SURGEON EDWARD S. BOGERT.

*Hygiene.*—The number of officers and men on board at present is 285. The cubic air-space allowed each individual on the berth-deck is about 72 cubic feet per man. Under the top-gallant fore-castle it is about 92 feet for each man. It should be noted, however, that the number of men now on board is some 30 in excess of the regular complement of the ship, so that the cubic air-space allowed each man, when the supernumeraries are sent out of the ship, will be somewhat increased.

The percentage of sick has been 2.23. There has been no mortality since the date of my connection with the ship.

The ventilation of the berth-deck is deficient and entirely inadequate for the number of men that must be berthed there. A ventilating-shaft, well forward, through which a windsail is introduced, and a double hatch in the after part of the deck, are the only means available for creating any circulation of air. Some artificial system of ventilation of the berth-decks of the vessels of this class is very much needed.

The lighting is good and sufficient. Warming is by steam-heaters, good and sufficient. Water is distilled on board, of excellent quality, and preserved in iron tanks. Food and clothing are according to the usual Navy ration and allowances.

The general hygienic condition of the ship has been very much improved by some alterations made when fitting out at the navy-yard, New York.

The floors of the magazines and store-rooms in the after part of the ship were raised and arranged in such a manner that portions of the bilge before inaccessible can now be readily reached and cleaned.

There is now no part of the bilge of the ship which cannot be reached for cleaning purposes, and the ship has been generally quite free from the odor of bilge-water since leaving New York.

*Medical topography.*—The population of Gibraltar, which is partly civil and partly military, amounts to about 17,000. The average winter temperature is 65°, summer 80° Fah. There are two hospitals, one military and one civil. The civil hospital was kindly shown me by Mr. Charles Trenery, the surgeon in charge. It has accommodations for about 100 patients, and is intended for the benefit of the civil population of Gibraltar, and for the treatment of seamen. There is an out-patient department. The hospital buildings are well situated on an elevation, and command a fine view of the harbor and shipping. The buildings are detached and rambling in arrangement, and have been probably adapted to hospital use, rather than built for the purpose. There are separate divisions for Catholics, Protestants, and Jews. The wards presented a neat and clean appearance, but nothing worthy of special note in the way of furnishing or ventilation attracted my attention.

Mr. Trenery, who has been forty years in Gibraltar, does not describe any special type of disease as prevalent there. He looks upon the so-called rock-fever which is said to prevail in the garrison, as not different from an ordinary ephemeral fever, and, in his view, it is rather the effect of excesses than of any special climatic influences. In his own terms it could be described as the brandy and soda fever.

The drainage of Gibraltar is provided by a system of sewers, which are considered, however, as rather deficient in ventilation; and either from that cause or from very imperfect plumbing-work in the house-connections, there has been a notable increase in the number of cases of typhoid fever since the sewers have been in use. Measures are now under consideration by the authorities to remedy these defects.

The water-supply of Gibraltar is from two sources. The rain-water is carefully collected and stored, every tenement being

obliged by law to furnish storage for all the water collected from its roof. There is also a source of water discovered a few years since on the neutral ground, which is not of good quality for drinking purposes, but which is nevertheless, I am informed, frequently furnished to shipping. I was informed on good authority that since this water has been used, the cemetery has been so drained that it can be used three feet more in depth than before. Officers of vessels purchasing water at Gibraltar should be cautioned against the water from the neutral ground. The rain-water will be furnished by the military authorities to men-of-war on proper application.

*Alexandria, Egypt.*—Population about 200,000. Average temperature for the winter about 55°, for the summer about 85° Fah. Rainfall light, there being only ten or twelve rainy days in the year.

The older portions of the city, occupied by the native population, are densely crowded, the streets are very filthy and apparently never cleaned. The modern portion is occupied mainly by Europeans, and is well built up, with wide streets and open spaces. The city is sewered, but on account of its flat situation there is very little fall to its drains, and difficulty is experienced on this account. The water-supply is drawn from the Mahmou-dieh Canal, leading from the Nile. The water is very thick and muddy, but when filtered is apparently of fair quality. No analysis of it was seen.

In spite of appearances, which would seem to indicate the contrary, the city is said to be tolerably healthy. The death-rate, as furnished from an authentic source is, for Alexandria, 40 per 1,000, in Cairo 50 per 1,000, and for Egypt generally, an average of 26 per 1,000. The infant mortality is very high, and forms the chief element in the bills of mortality of the cities above mentioned, but exact figures, as distinct from the general population, were not obtained. Diseases of the eye are very prevalent.

Numerous cases of conjunctivitis, both simple and purulent, opacity, ulcer of cornea, and of staphyloma may be observed in the streets.

*Aden, Arabia.*—(Ships lie at Steamer Point, or Bunder, some five miles from the town of Aden.) Population about 40,000. The average temperature in winter is from 80° to 85° Fah., in summer about 100° Fah. The thermometer is said to reach 108° occasionally. The climate is very dry, sometimes six to eight years passing without rain except a few slight showers during the winter. The surrounding country is almost entirely volcanic rock and sand. There is very little vegetation.

The water-supply is partly from rain, for the collection and storage of which some very capacious tanks are built in the course of a ravine near Aden, but the greater portion of the water used at Steamer Point and for shipping is condensed from sea-water. The place is said to be very healthy and free from malarial diseases.

Aden is in possession of the English Government, and garrisoned mainly by Indian troops. The population is mixed, and consists, besides the garrison, of Arabs, Parsees, and Negroes, the latter constituting apparently the majority.

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#### U. S. S. PALOS.

##### REPORT OF ASSISTANT SURGEON LLOYD B. BALDWIN.

*Medical topography.*—In what follows I have studied to avoid inserting whatever to my knowledge has already been reported to the Bureau from this station.

I joined this ship at Shanghai, China, April 14, 1877, relieving Assistant Surgeon H. Wikoff. For the past nine months, excepting, in all, six weeks, we have been off Shanghai, latitude 31° 15' north, longitude 121° 29' east. The old walled city of

Shanghai, and European concessions are on the north bank of the Hwangpoo, about twelve miles from its junction with the Yang-tse-Kiang. The country around is flat, the cities being in the midst of a large plain, unbroken for many miles.

The prevalent diseases have been dysentery, diarrhœa, and malarial fevers. The absence of abdominal symptoms in typhoid fever is remarkably frequent. Lumbrici are common among adults as well as children; drinking unboiled water and eating imperfectly cleansed salad and celery contribute to this form of life.

Experience in Shanghai is tolerably uniform as to the excellent health acquired by old residents who take good care of themselves, and avoid excesses. There are few who have actually entered upon old age, but there are many in advanced middle age who have spent twenty years and above in China.

The use of Shanghai ice for cooling beverages, as allowing lumps of ice to dissolve in a fluid intended to be drunk, is here always dangerous. People who imagine that impure water can make perfectly pure ice; that all living germs are destroyed by freezing; or, that by washing the fragments of ice they avoid all danger, entertain equally false and delusive ideas.

The water-filtering works supplied with water from the river, and so frequently described, have in no particular been improved. The surrounding country for many miles is purely alluvial. The numerous natural swamps are supplemented by a large extent of land artificially submerged periodically for the cultivation of rice—thus presenting the unfavorable condition which usually prevails in the neighborhood of marshy land, particularly when subjected to a powerful heat—the drainage from which enters the river through numberless creeks. During spring, summer, and autumn the fields are plentifully manured with night-soil, more or less diluted, which has previously been permitted to mature in vats, and contribute their

quota of impurities by drainage, with that from the up-country villages, all finally reaching the river. The inefficient drainage, with no satisfactory method of flushing the sewers; the quantity of vegetable refuse permitted to accumulate in unfrequented spots, and the constant traffic along the narrow streets, swell the amount of impurity in the river, especially after rain. This water contains abundant organic impurities, requiring no more delicate test than the sense of smell in warm weather. Once during the summer it became so offensive from decomposition of organic matter, after being in one of the tanks less than seventy-two hours, that no one could drink it. I have not the least doubt that it was the cause of most of the cases of diarrhoea which came under my care during the summer. I found this disease, however, very amenable to treatment, rarely indeed placing the patients on the sick-list. Admit the prevalence of typhoid fever, dysentery, and cholera, must they not be disseminated by this water? I cannot believe that filtering once through a few feet of charcoal and sand will effectively destroy all germs of disease. Every vessel of the United States Navy should be provided with the proper apparatus for distilling and aerating all water used for cooking and drinking on this station.

There are four hospitals here—three native and one foreign. The Shanghai General Hospital is a fine large new building in Hongkew, on Soochow Creek, facing the south. Nursing is well done by Sisters of Charity. The building is commodious and airy.

There was no epidemic cholera here during the summer. A few sporadic cases were reported.

I give an aggregate sick-report, for the past nine months, of the vessel. In the case of death, remittent fever, the disease originated on board the United States ship *Ashuelot*, from which vessel the patient was transferred to the general hospital, where he died. He was not on board this vessel during his illness.

*Aggregate report of sick for the second, third, and fourth quarters, 1877, United States ship Palos (4th rate), Asiatic Station.*

Class.	Order.	Disease.	Admitted.	Discharged to duty.	Transferred.	Died.
1	1	Febris remittens.....	1			1
1	3	Alcoholismus.....	2	2		
1	3	Delirium tremens.....	1	1		
4	6	Catarrhus.....	1	1		
4	7	Diarrhœa acuta.....	2	2		
4	7	Dyspepsia.....	1	1		
4	7	Gastritis.....	1		1	
4	8	Calculus (renal).....	1	1		
4	9	Arthritis.....	1	1		
6	1	Contusio.....	1	1		
6	1	Stremma.....	1	1		
6	1	Vulnus punctum.....	1	1		
		Total.....	14	12	1	1

Total number sick-days, 65; daily average of patients,  $\frac{1}{3}$ ; ship's complement, 50.

Many have been annoyed by what is usually called dobe, or washerman's itch. The cases I have examined could be classified as parasitic and non-parasitic eczema. The non-parasitic required merely rest and local sedatives for the simple inflammation of the skin; the parasitic was accompanied by intense itching, and required parasiticides.

Not a single case of syphilis has been contracted during the nine months. Considering the frequent liberty this is remarkable. Gonorrhœa is quite common, but very amenable to treatment.

During June last, on our way to Nanking, where I met with nothing worthy of mention professionally, we called at Chin-kiang-foo. Dr. Platt informed me that notwithstanding bad drainage, stagnant pools, the transportation of night-soil, a dense population, and bad location, scarcely any sickness existed except dysentery and diarrhœa. He speaks quite favorably of the hypodermic use of bromo-hydrate of quinia in malarial fevers.

In the early part of September, 1877, we visited the new port of Wenchow. This city having been built somewhat upon the side of the bluffs and traversed by a comparatively rapid flowing canal, is unusually well drained. It rained every day during the week we remained, and I learned little or nothing of the place. The Customs physician informed me that about thirty were dying daily from cholera. A missionary told me that the Chinese themselves did not consider it epidemic cholera, with which they are familiar, but rather the customary disease from dietetic errors. From limited observations I was inclined to favor the latter view.

Leaving Wenchow we returned north to Ningpo, latitude 30° north, on the left bank of the Ningpo River, about twelve miles from its junction with the sea at Chinhae. The range of temperature is very great. The southern monsoon, steadily blowing from April to October from the hot plains of Asia, renders the summer heat intense, while the northern monsoon, blowing from October to April, increases the cold natural to the latitude, producing ice several inches thick on the flooded paddy-fields, which is carefully stored for summer consumption.

At New Orleans, almost identical in latitude, the heat is never so intense and the formation of ice is unusual. There is no water fit to be used except that of the perennial springs at Taying. It is brought from the vicinity of the stone-quarries in water-boats.

The foreigners may well congratulate themselves in being able to escape the enervating effects of their climate by a few hours' journey to the "Hills," which compensate them for the absence of the drives, beaches, sea-breezes, and bunds of other ports. The easily accessible Tien-dong or Fung-hwa ranges offer great variety and beauty of scenery. The Fung-hwa I visited; the fertile fields taxed to their fullest capacity for production, yielding crop after crop in unceasing succession,



through a tortuous valley many li in length, were well calculated to please the agriculturist. The beautiful and unique fronds, and the endless variety of wild flowers among the dells and ravines, would certainly be a botanist's paradise in the "Flowery Kingdom."

Leaving Ningpo we spent a week in the Chusan Archipelago. At Pootoo, the sacred island, we had excellent bathing. It is a suitable resort for our vessels at Shanghai or Ningpo during epidemics at these places.

Relating to the progress of medical science, I may mention that P. Manson, M. D., Amoy, in the Customs Medical Reports for the half year ending March 31, 1877, contributes an interesting article on *Hæmatozoa*, particularly describing the *Filaria immitis* and *Filaria sanguinolenta* as found in the dog. The connection of hæmatozoa with elephantiasis in man is discussed, and from which I quote:

"I have lately found in the blood of a patient who came to me for the removal of an elephantiasis scroti, numerous specimens of embryo filaria. I am thus enabled to state positively that *Elephantiasis arabum* is a parasitic disease, and to establish on solid and incontrovertible grounds what in a former report I conjectured was the true pathology of this puzzling affection. \* \* \* The *Filaria sanguinis hominis* resembles very closely in general appearance and movements the canine hæmatozoa, \* \* \* measures slightly less than  $\frac{1}{3000}$  of an inch in breadth by about  $\frac{1}{50}$  of an inch in length. \* \* \* The canine variety appears to be naked and structureless; the human, on the contrary, is provided with a very delicate, non-contractile integument, within which the body of the animal is incessantly shortened and elongated. \* \* \* There is about the centre of the body an elongated yellow patch, \* \* \* which I believe appertains to the alimentary canal. Distinct movements of a mouth can be made out at the extremity of

the head. They resemble the breathing movements of a fish's mouth."

After detailing many cases, he adds:

"From these observations I think the following deductions are justifiable: 1. That a large ratio of the population of this province \* \* \* is infected with the *Filaria sanguinis hominis*. The exact ratio cannot yet be stated, but if my observations are a fair guide, one in thirteen is near it. 2. That the *Filaria sanguinis hominis* may be present in the blood, and yet the host be in good health and exhibit no other morbid phenomena. 3. That in the same person it may be present at one time and absent at another. 4. That at one time or another it is very generally associated with elephantoid disease, and is almost certainly connected with the cause of such affections. 5. That it is sometimes associated with a diseased condition, characterized by frequently recurring attacks of fever, accompanied by general anasarca unconnected with heart or kidney disease."

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#### U. S. NAVAL HOSPITAL, YOKOHAMA, JAPAN.

##### REPORT OF SURGEON JOHN W. COLES.

During the last fall an epidemic of cholera took place in Japan, and through the kindness of Dr. B. F. Simmons, who is medical adviser of this ken, and who has charge of the native hospital at Yokohama, I am able to give a tabular statement of cases, deaths, etc., together with some of the means taken by the authorities for stamping out the disease.

Tabular statement of cholera in Japan.

Kens.	Date of appearance.	Number of cases.	Number of deaths.	Per cent. of deaths.	Per cent. of population.	Population.
Kumamoto	Sept. 22	2,016	960	47.62	20.89	965,242
Osaka	Sept. 22	1,636	1,256	76.77	29.17	596,869
Nagasaki	Sept. 10	1,339	660	49.29	11.06	1,210,723
Kanagawa	Sept. 5	1,142	643	56.30	16.68	684,733
Tokio	Sept. 14	872	539	61.81	9.79	890,681
Chiba	Sept. 18	576	317	55.03	5.46	1,055,373
Kagashima	Sept. 17	475	193	40.63	3.97	1,197,763
Hiogo	Sept. 22	483	345	71.43	3.02	1,334,170
Fukuoka	Oct. 2	515	306	59.42	4.42	1,164,976
Sakai	Sept. 2	213	134	62.01	2.26	896,782
Okoyama	Oct. 6	178	87	48.88	1.52	1,172,001
Wakayama	Sept. 28	155	80	51.61	2.71	572,436
Yamaguchi	Oct. 3	66	27	56.41	1.39	838,946
Hiroshima	Oct. 4	94	50	53.19	1.00	942,827
Owake	Oct. 2	137	69	50.36	2.36	580,347
Kaitakushi	Sept. 27	74	52	70.27	4.97	149,008
Kioto	Oct. 3	70	54	77.14	.85	825,206
Ebaragi	Sept. 26	68	36	52.94	1.80	378,289
Kochi	Oct. 10	99	44	44.44	1.86	531,863
Sakitama	Oct. 3	53	22	41.51	1.20	440,433
Shidzuoka	Sept. 29	50	32	54.24	1.06	544,880
Miye	Sept. 27	69	40	57.97	.87	797,310
Shiga	Oct. 4	36	22	61.41	.42	859,173
Elyhime		97	49	50.52	1.23	791,522
Yamanashi	Sept. 24	31	9	29.03	.84	369,255
Onmari		25	10	40.00	.52	484,428
Fukujima		20	4	20.00	.71	281,302
Ishikawa	Oct. 2	23	13	56.52	.14	1,664,973
Shimane		7	3	42.86	.07	1,008,791
Gumba	Oct. 3	6	1	16.67	.07	828,420
Aichi		6	3	50.00	.05	1,234,063
Gifu	Oct. 10	6	5	83.33	.06	965,216
Akita		2	2	100.00	.03	609,420
Niigata		11	2	18.18	.07	1,493,117
Tochigi	Oct. 12	2	00		.03	648,503
Chono		2	00		.04	481,351
Army at—						
Hiogo		402	238	59.20		
Kioto and Shiga		389	170	43.70		
Kagashima		350	160	46.00		
Osaki		140	73	52.14		
Nagasaki		99	58	58.59		
Tokio		92	41	44.57		
Kumamoto		58	24	41.38		
Hiroshima		7	6	71.43		
Kaitakushi		5	2	40.00		
Chima		5	1	20.00		
Navy at—						
Tokio		30	10	33.33		
Shinagawa		28	8	28.57		
Yokaska		24	5	20.83		
Uraga		6	3	50.00		
Yokohama		1	1	100.00		
Mitsui Bishi Steamship Company		37	13	35.14		
Total		12,376	6,019	55.91	4.21	29,399,912

The disease appeared in this place about the 5th of September. The first cases were among the natives outside of the

foreign settlement, and broke out in almost as many different quarters as there were cases. As soon as cholera was officially reported immediate steps were taken by the authorities of Yokohama to check its spread. A board of health was organized, consisting of the governor of the ken, the chief of the police, the heads of the educational and the land departments, and others, with Dr. Simmons as the medical and sanitary adviser.

The town was divided into districts, with the different police-stations as headquarters, where disinfectants, medicines, and physicians were to be found. The streets, yards, etc., were thoroughly inspected, cleansed, and disinfected. A quarantine hospital was built down the bay for the convenience of cases occurring among the shipping, and another hospital was put up for cases from the town. When a case of cholera was reported at a police-station a physician was immediately sent to the place. If the patient was not able to be properly treated at home he was sent to the hospital. The house was disinfected with carbolic acid, sulphate of iron, sulphurous acid, and burning sulphur. A placard was posted on the door of each house where the disease existed, warning people of its presence. All clothing, mats, bedding, etc., used by those having the disease were burned, the ken paying for them, and in case of death the body was disposed of in the same way.

A foreign board of health was also formed by the authority of the different consuls, consisting of foreign physicians and a number of the principal business men. This board divided the foreign settlement into districts, and assigned inspectors to each. House to house inspection was made, and directions were given as to disinfection and the removal of filth. Printed circulars were also freely circulated, giving directions as to disinfection, cleaning yards, etc.

The native authorities certainly deserve a great deal of credit

for the energetic manner in which they went to work to rid themselves of the pest. But, notwithstanding that all the precautions given above were taken, the evacuations from the bowels were stored in pits to be distributed throughout the neighboring country as fertilizers. The native health board was advised to have all night-soil taken well out into the harbor and dumped into the sea, but this they declined to do, as the farmers depend almost entirely upon it for manure. If they were deprived of it the crops might fail, causing a famine which would perhaps be more fatal than the cholera.

The table given makes it appear that cholera broke out at Yokohama before any other place in Japan. This must be a mistake, as the disease was reported in the early part of September at Nagasaki and Kagashima. It was probably first taken to Nagasaki from one of the Chinese ports, where it was epidemic during the summer. From Nagasaki it was carried by troops to the Kagashima districts, and was brought to Yokohama from either of these two places by one of the numerous ships which were engaged in carrying soldiers between these ports. The disease here appeared to be fed by fresh cases from the constant arrival of troops who had been engaged in suppressing the revolt against the government in the south.

In Tokio nearly all the cases occurred within a radius of a mile around the terminus of the Tokio and Yokohama Railroad, by which troops from the south were constantly being carried. For a long time Hakodate seemed likely to escape the disease, but a steamer carrying troops went into that port with a number of cases of cholera on board. The troops were landed in opposition to a request from the governor, and it spread in the district.

Nothing of importance was discovered in the way of treatment of the disease. A great variety of treatments was tried, but with little difference in the result. Heavy rains always

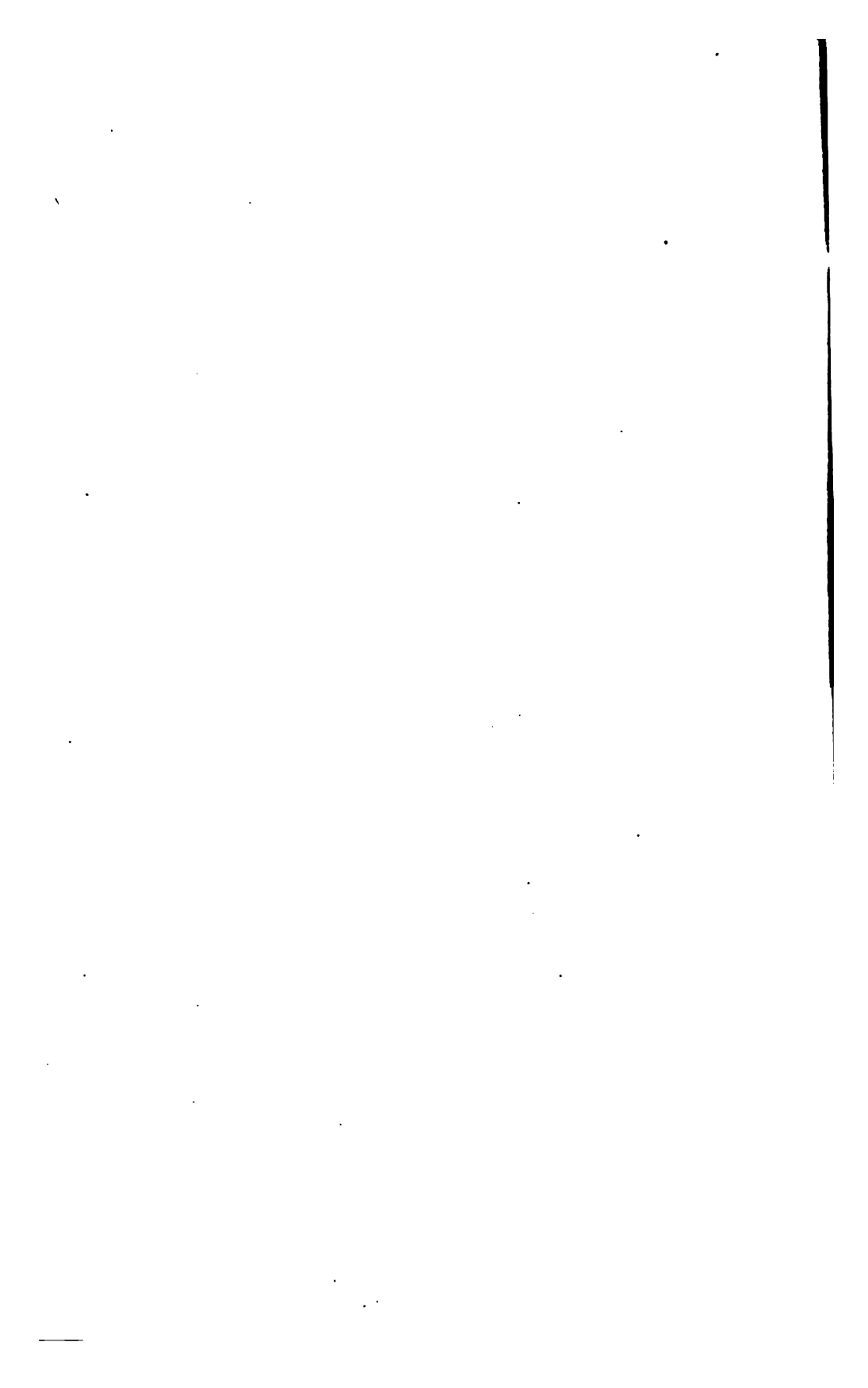
increased the number of cases, probably from the surface-drainage entering the wells from which drinking-water was procured.

Heretofore cholera has been introduced into the United States by the way of Europe, but it is possible that in the future it may also be carried to San Francisco from this place, as steamers frequently cross the Pacific in less than twenty days.

The Prussian Government has erected a naval hospital at Yokohama during the last year. It is situated in that part of the foreign settlement known as the "Bluff," and is constructed of bricks, elevated on arches. It consists of two parallel one-storied buildings, with attics in the front ends. The two buildings are connected by a covered passage-way. The ventilation is by perforated bricks near the flooring, and by registers communicating with flues near the ceilings in the rooms, and ridge-ventilators in the wards. The cost of erection was about \$40,000, and it is one of the most substantially constructed buildings in Yokohama.

I have nothing of importance to report besides the above, as the three previous reports sent from this hospital, since 1873, gave a description of this building, together with other hospitals in Yokohama, and especially dwelling upon the advantages Yokohama possessed as a sanitarium.

**NORTH ATLANTIC STATION,**  
**1878.**





## NORTH ATLANTIC STATION.

### U. S. S. POWHATAN.

#### REPORT OF FLEET-SURGEON JOHN Y. TAYLOR.

I submit the following remarks in relation to the sanitary condition of the North Atlantic squadron.

My orders as fleet-surgeon of the North Atlantic Station, for duty on board the United States ship Powhatan, were dated July 5, 1877, this vessel having been detailed to take the place of the Hartford as flag-ship, July 6, 1877, at Hampton Roads, Virginia.

The squadron at that time consisted of the Powhatan, Plymouth, Swatara, Ossipee, Huron, Enterprise, New Hampshire, Pawnee, and seven monitors. At present it is composed of the Powhatan, Plymouth, New Hampshire, Pawnee, Canonicus, and Fortune.

A detachment of 250 seamen and marines was sent from this station July 22, 1877, to Washington, for distribution to various points for the purpose of assisting in the suppression of the railroad riots of that year. They were absent one month, and returned in good condition, without casualties.

The aggregate report of sick for the second quarter, 1877, made from the records on hand when I reported for duty, presents the average number of persons in the squadron, 1,542. Total number of sick-days, 2,423. Daily average number of sick,  $26\frac{5}{7}$ . Only one death, a seaman, of chronic bronchitis.

The aggregate report of sick for the third quarter, 1877, appears as follows: Average number of persons in the squadron, 1,210. Total number of sick-days, 1,605. Daily average number of sick,  $17\frac{11}{12}$ . One death, private marine, of erysipelas.

The aggregate report of sick for the fourth quarter, 1877, gives the average number of persons in the squadron, 1,316. Total number of sick-days, 1,793. Daily average number of sick,  $19\frac{4}{5}$ .

On the 24th of November, 1877, the Huron was totally wrecked near Nag's Head, on the coast of North Carolina, with the loss of ten officers and one hundred and fourteen men.

January 19, 1878, I was temporarily detached for three months from the North Atlantic Station, with orders to rejoin the Powhatan at the expiration of that time, having been relieved by Surgeon Michael Bradley, as fleet-surgeon, by whom a report was made to the Bureau of a short visit by the ship to some of the West India islands.

The record of the first quarter, 1878, shows the average number of persons in the squadron, 1,320. Total number of sick-days, 2,226. Daily average number of sick,  $24\frac{6}{10}$ .

The aggregate report of sick for the second quarter, 1878, gives as follows: Average number of persons in the squadron, 1,131. Total number of sick-days, 1,654. Daily average number of sick, a small fraction less than 19.

It is a gratification to be able to state that, during the year 1878, characterized by a great epidemic of yellow fever, the North Atlantic squadron has not suffered from any other than the usual diseases incident to life on board ship, with the few exceptions hereafter to be mentioned. The ordinary percentage of zymotic, enthetic, and diathetic affections has been exhibited, as appears in the reports transmitted to the Bureau of Medicine and Surgery.

Early in July, 1878, several cases of a malignant fever occurred on the United States ship Vermont, at the New York navy-yard. The disease was decided to be yellow fever, and a board of naval medical officers was designated to investigate the origin of it. They were of the opinion that it originated

from the ballast of the bark *Juanita Clara*, which left Havana, May 1, and, on the 19th of June, commenced to deposit her cargo, of several tons of porous stone and sand, upon the dock near the Vermont. There were six marked instances of the disease, three of which terminated fatally at the naval hospital. The weather was oppressively warm during the greater part of the month of July, the temperature being almost constantly near 90° Fah. The Powhatan was at the New York navy-yard at this time, undergoing repairs, but had no cases of unusual interest on board.

It is worthy of remark that when this fever first appeared, a dredging-scow was in operation within a few yards of the Vermont, and the intensely offensive mud, composed chiefly of sewer-deposit, brought up from the bottom, was transported some distance, to be used as filling. The dredging was discontinued about the 19th of the month, in compliance with a recommendation of the Brooklyn board of health.

Yellow fever began to appear in New Orleans, La., about July 12, 1878. It did not assume an epidemic form until the end of that month, when the whole number of cases amounted to near 150, and the deaths to 40. By the 10th of August there were 466 cases and 126 deaths, with a rapid spread of the disease and proportional mortality.

On the 11th of September a cold north wind set in, with a marked addition of the daily number of deaths; many who were convalescent relapsed and died of nephritic congestion and uræmia. At 11 p. m. on that day the temperature was recorded at 68° Fah., and still falling. It was expected that this would act as a check to the disease. Besides, according to the advocates of periodicity, the epidemic had now reached its climax, from which the virulence ought steadily to decrease. But on the last day of September the total number of cases reached 9,616, and the deaths 2,898; augmented by the end of the first week of Octo-

ber to, total cases, 10,600; deaths, 3,212. On the 25th of this month the whole number of cases was 12,992, and deaths 3,882.

Thus this epidemic seemed to disappoint all predictions founded upon former experience. A prominent physician published a statement to the effect that in an extensive practice of many years in New Orleans, he had never known a child born and resident in the city to be attacked by yellow fever, yet the death-list of the 21st of September includes 26 children under seven years of age, presumably most of them natives of the town.

It was not until the latter part of the month of October that the disease began to decline in the city of New Orleans; and on November 2, when the board of health declared the epidemic at an end, the total number of cases was 13,166, deaths 3,945. Some additional ones up to November 9, increased the figures to 13,406, total deaths, 4,010. It has been estimated, approximately, that in all parts of the country affected by this visitation, not less than 20,000 persons perished, rising to a national calamity. The mortality was from 16 to 20 per cent.

The fever first made its appearance at New Orleans, and whether it was imported or originated spontaneously, is still a disputed question. Whether it ever is of truly spontaneous origin is as yet undecided, but the weight of evidence seems to be in favor of importation.

None of the ships of the North Atlantic squadron were exposed in infected ports, except the *Canonicus* at New Orleans. Upon the breaking out of the epidemic, all were removed from that vessel, except a few acclimated individuals necessary to remain in charge. Up to September 30, there had been 17 cases of yellow fever on board the *Canonicus*, with 9 recoveries, 7 deaths, and one remaining under treatment.

It is still to be seen what lessons of value, if any, may be deduced from experience in this last destructive epidemic. More

than 100 physicians lost their lives in the fever-districts in the performance of duty, many of them being volunteers from points remote from the infected regions. It is to the survivors who have been laboring in the midst of the pestilence that we must look for information. Pathological observations conducted by Prof. T. O. Summers, of Nashville, and others, have been very numerous. They have shown important lesions at the base of the brain, a "boxwood liver," degenerated kidney, and an enormously hypertrophied spleen in almost every instance.

The profession naturally expects to hear something of the treatment of the disease from those who witnessed its progress. But, in general terms, it appears that all medication proved to be lamentably unsatisfactory and disappointing. A few remarkable recoveries are reported as having been brought about by the "ice treatment," but nothing further than that can be said in its favor.

The question suggests itself, is there any recognized treatment for yellow fever?

It is believed by some careful medical observers that the coming year will bring a continuation of the epidemic, which has but now subsided, as the latent germs or peculiar poison of the disease, still existing in so many localities, will be revived in renewed virulence with the next summer. It has long been known that the so-called germs of yellow fever, while they are destroyed or rendered inert by a very high or very low temperature, under certain conditions may remain quiescent for an indefinite time, and afterwards resume their activity and power of multiplication. Beyond this there is absolutely nothing ascertained in relation to these "germs." They elude alike the pathologist and the microscopist. As for the Bacterian theory, it may be said to be, as yet, in its early infancy.

In fine, the best practical application of what is known of this fever, whether its origin be spontaneous or from importation,

and whatever may be the nature of its peculiar virus, is contained in one precept—rigid quarantine and sanitary regulations.

The aggregate report of sick for the third quarter, 1878, shows the average number of persons in the squadron, 901. Total number of sick-days, 1,349. Daily average number of sick,  $14\frac{6}{5}\frac{1}{2}$ .

Eight deaths occurred during the quarter, seven from yellow fever and one from drowning, all attached to the United States ship *Canonicus*, at New Orleans, La.

The *Plymouth* was sent, on October 6, to Santa Cruz, West Indies, during the negro insurrection at that place. She coaled at St. Thomas, and about nine days afterwards several cases of fever appeared on board, some of which were developed into what was pronounced to be yellow fever. Two midshipmen and two private marines were transferred to the civil hospital at Frederickstadt, Santa Cruz, West Indies, where the officers both died, and one of the marines.

The aggregate report of sick for the fourth quarter, 1878, gives the average number of persons in the squadron, 927. Total number of sick-days, 1,122. Daily average number of sick,  $13\frac{1}{7}\frac{2}{8}\frac{1}{2}$ .

Four deaths occurred during the last quarter, three from yellow fever, as above stated, and one from pneumonia on board the United States ship *Canonicus*, at New Orleans, La.

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#### PRACTICE CRUISE, U. S. S. MAYFLOWER.

##### REPORT OF ASSISTANT SURGEON JOHN A. TAXNER, JR.

The cruise has been of such a nature as to admit of a liberal and varied supply of fresh provisions and an abundance of good fresh water; at no time was the vessel out of port more than two days. These facts, coupled with uniformly good weather and cruising along the healthiest part of the North Atlantic coast, placed the vessel under the best hygienic influences.

The cadet-engineers, 34 in number, occupy the upper and lower steerages, 17 swinging and messing in each. The cubic space per man in the lower steerage, as found by careful calculation, taking into consideration the beams and other irregularities of surface, is 163 feet, or, allowing 5 feet for each man and hammock, it is 158 feet per man. The ventilation of this steerage is accomplished by two ventilators each 8 inches in diameter and a hatch 45 by 50 inches, opening in the forward end, two ventilators each 8½ inches in diameter opening on each side about the middle, and one 13½ inches in diameter opening aft. Besides these there is a door communicating with the fire-room, which (with the forward ventilators) serves as an exit for the air, and when steaming or in port under banked fires as a suction-flue.

Ventilation is as good as can be obtained, but is not sufficient. In order to supply the necessary amount of fresh air for the number, calculating upon the basis that air containing .8 volumes of carbonic acid in 1,000 volumes, can be breathed with no very material injury to health, the air in the steerage will have to be removed at least ten times per hour, which, if possible under the present arrangement, would create dangerous draughts. At 8.30 p. m. the amount of carbonic acid in the air of the steerage was found to be .735 parts in 1,000; at 6 a. m. the next morning it was found to be 1.10 parts in 1,000, indicating that the air is not removed with sufficient frequency; the second observation would indicate that during the greater part of the night an injurious amount of carbonic acid and animal matter is exhaled by the lungs. In the lower steerage the lockers for all the cadets are placed; and the store-rooms of the cabin, steerage, paymaster, and other store-rooms open into it. With the best possible care decaying animal and vegetable matter will collect in these lockers and store-rooms, and charge the air with impurities injurious to health.

The air-space in the upper steerage is 125 cubic feet per man, but owing to the number of windows and doors this steerage is almost as open as under an awning in the open air.

The crew, 45 in number, occupy the berth-deck and drum-room, 32 the former, the remainder the drum-room. The air-space on the berth-deck is 73 cubic feet per man, and its ventilation is accomplished by a hatch 55 by 50 inches, aft, a ventilator 16 inches in diameter, forward, and two air-ports on each side. The air is not as pure as in the lower steerage, and by observation it is found to contain from .3 to .5 parts more of carbonic acid per 1,000 than in the steerage.

The drum-room gives sufficient air-space and ventilation, but from its situation has a temperature averaging 26° C. and gives 2.7 parts of carbonic acid in 1,000 volumes of air; in addition, the air is contaminated by the water-closets.

The water-closet and toilet accommodations cannot be too strongly condemned; they break all laws of hygiene and common decency. The closet for the cadets and pilot measures 35 by 40 inches, contains one urinal and one bowl, and is situated just inside the drum-room, over the boilers, the escape-pipes passing directly over the boilers. Its temperature is often 26° C., a temperature conducive to putrefactive change, and as a result the urine and fecal matter constantly present, undergoes rapid decomposition and gives the air around a distinct ammoniacal smell, besides filling it with other injurious gases and offensive odors, which constant care and the free use of carbolic acid cannot prevent. Even if the situation was better, to keep it in order is impossible, for it is not sufficient for the accommodation of 35 persons.

The toilet arrangements consist of two permanent wash-bowls and ten movable tin basins, which are barely sufficient for a simple bath, while for a general bath there are absolutely no conveniences. For the regular morning bath the movable ba-



sins are arranged along the rail, and those using them are frequently exposed to inclement weather.

The sick-report shows a comparatively low sick-list, due, I consider, to the fact that the vessel has been in port most of the time, and the cadets and crew have had frequent opportunities to go ashore. On board all has been done that was possible to keep the vessel clean and healthy, the spar-deck being frequently cleansed and the steerages and berth-deck thoroughly shellaced when necessary; and again, only those cases were entered upon the list that could not attend to duty, many cases of simple diarrhœa, bronchitis, malaria, etc., receiving treatment and remaining on duty. The length of the cruise is too short to show the ill effects of overcrowding and impure air, since the effects are not shown in an acute form, but in a general lowering of the system and rendering it more susceptible to disease.

After three months' careful observation, it is my opinion that the vessel, in a hygienic point of view, is unsuited for the service upon which she has been employed during the past summer.



SOUTH ATLANTIC STATION.



## SOUTH ATLANTIC STATION.

U. S. S. HARTFORD.

REPORT OF MEDICAL INSPECTOR ALBERT C. GORGAS.

During the year 1878 the Hartford was at Montevideo, in Uruguay, and at Rio de Janeiro, Santos, and Santa Catharina, in Brazil.

We arrived at Montevideo on the 2d of January, after a voyage of fourteen days from the anchorage off Rio de Janeiro. Although we had not entered the harbour of Rio our communication with that port subjected us to the fifteen days' quarantine imposed upon vessels from Brazilian ports, and "pratique" was not given us until the following day, the fourteen days of our voyage being of course included.

Montevideo, the capital of Uruguay, in latitude  $34^{\circ} 54'$  south, is built upon a point of land extending out into the Rio de la Plata from the main, in a direction from ENE. to WSW. This point is of granite rock which slopes on either side and towards its extremity to the water.

The river-water at Montevideo is brackish. On the northern side of the point an almost circular bay is formed by the curve of the land, at the head of which, where the city begins to spread out upon the mainland, is a considerable area of land reclaimed from the bay.

The city of Montevideo is regularly laid out, the streets are well paved and clean, the houses built of stone or brick, the latter generally stuccoed, and painted or washed white or some light color. There are several plazas, three of which are within the built-up part of the city. In these, besides flowering plants and shrubbery, the *Eucalyptus globulus* has been extensively

planted. The same tree is frequently seen along the streets, where it shades the sidewalks, and in the country roads in the suburbs, as well as in the grounds of the numerous villas and cottages near the city. There is a cathedral, a fine building for customs, a handsome theatre, and a large hospital, the "Caridad" or Charity. This last occupies one square of the lower town. Like most of the buildings here, it contains interior patios, or courts, into which windows and doors open, and some of which are surrounded by galleries. These patios are planted with trees and shrubbery and form very pretty gardens. The outer wards have windows opening upon the street, and others communicating with the patios. The inner wards open on either side into patios, so that, in this mild climate, where it is almost always practicable to keep up free communication with the outer air, the subject of ventilation as well as that of heating presents no difficulties. The hospital can accommodate about six hundred patients. The establishment is well kept; the wards, offices, kitchens, baths, and water-closets being in good order, neat and clean. The expenses of the hospital are entirely defrayed by the profits of weekly lotteries. Seamen from men-of-war are received here at the rate of \$1 per diem. There is a ward for patients from the prisons, and one for the soldiers in garrison. These last are attended by their own medical officers. At the British Seaman's Hospital in the calle Guarani, sailors from men-of-war are treated at the same rate as at the Caridad.

A lunatic asylum is building near the city.

The water-supply of Montevideo is good. It comes from the Santa Lucia River, and the works are at the town of the same name, about twenty miles away. Besides this, most of the houses are provided with cisterns built in the patios. In these the rain-water is collected. The cistern-water is generally good, and is sometimes preferred for drinking to the Santa Lucia water, but the proximity of the latrines and the imperfect walls

of the cisterns have in some instances caused poisoning of the contents of the latter, to which typhoid fever has been traced.

The turtle-back shape of the Montevidean peninsula facilitates drainage and sewerage. The latter, however, is imperfect, and it is a subject of complaint that the sewage sometimes leaks through and permeates the ground, especially in those parts of the city where the irregularities of the rocky foundation have been filled in with earth, rubbish, etc.

The water in the bay on the northern side of the town is to a certain extent stagnant, and the sewage emptied into this contributes to its unwholesomeness. It would greatly improve the condition of the bay to avoid this addition to its impurity, by extending a large main pipe around to the northern side of the point, where the current would speedily carry off its outflowings.

The population of the city of Montevideo is about 95,000. The census of 1875 gave 95,152. In that year there were 2,728 deaths. Of this number, the causes of death of 1,042 were unknown, but of the remaining 1,686, 141 were from fevers, 106 from diseases of the circulatory system, 231 from diseases of the cerebro-spinal system, 535 from diseases of the respiratory system, 265 from diseases of the digestive system, 95 from diseases of the nervous system, 90 violent deaths and accidents, and 223 from diverse causes. In the last class are included alcoholism, syphilis, cancer, erysipelas, old age, etc. From this it will be seen that the proportion of deaths from pulmonary diseases, supposing the same proportion in the undiagnosed 1,042, is about one-third of the whole number. This is somewhat surprising in a dry climate, in which the temperature is so mild, and the range of which is so limited.

There are, however, throughout the year, very sudden changes from the warm sultry northward and westerly winds, to the cold southwesterly and chilly southeasters. The large, in a

double sense, floating, population composed of the crews of the merchant ships in port, no doubt contributes considerably to this class of disease. The average death-rate of Montevideo is 28 per thousand.

During three months of our stay in Montevideo, the number of admissions to the sick-list, exclusive of wounds and injuries, was 53. During the same length of time at Rio de Janeiro, the number was 90, of which 37 were cases of malarial fever. There is no malaria at Montevideo. Liberty was freely given to the crew here, and, although no inspection is practised, the number of cases of venereal disease was very small.

The endemic presence of yellow fever in Rio de Janeiro, and its frequent epidemics there and in other Brazilian ports, make the question of quarantine a very important one. After the 1st of December, all vessels from Brazil are subjected to a quarantine of from fifteen to twenty days, or longer, according to the severity of the disease in Rio or other ports. The quarantine station is at the island of Flores, where provision is made for the reception of passengers and cargo. Flores is about fifteen miles down the river. There have been three epidemics of yellow fever at Montevideo, viz, in 1856, 1872, and 1873.

In Buenos Ayres a severe epidemic occurred in 1871, in which, although a great proportion of the population fled to the country, out of 170,000, there were 17,000 deaths.\* It appears probable that the epidemics of yellow fever in the River la Plate were imported from Brazil.

In 1878 there were 32 cases in Montevideo, of which, it appears, all but two were fatal. The first of these cases was traced to a Spanish brig, the *Premiat*, which came from Rio. After this vessel had been in quarantine twenty days, two of the crew were attacked with yellow fever in a house in the town. The patients and all the inmates were immediately sent to the

\* Beobachtung über Gelbes Fieber in Montevideo.—Dr. C. Brendel.



quarantine island, and the house disinfected. About twenty days after this, a man, who had been a sanitary guard on board the same vessel, was attacked. Seven days after, a lady died in the calle Paysandu (a street on the northern slope of the town, near the bay) of the same disease, her case having been concealed by the ignorance of her physician. Of course no sanitary measures were taken by the authorities at the time, and a week afterwards the fifth case occurred in the same square, another the next day, and in four days four more. All the subsequent cases were in the neighbourhood of this square, and there is no doubt that the disease was thus confined, and a serious epidemic prevented, by the energetic measures taken by the authorities. As soon as a case was reported, it and all the inmates of the house, and in several instances of the square in which it was found, were removed from the town. Bedding and clothing were destroyed, disinfectants employed, and the square surrounded by policemen to prevent people from entering the infected district.

It is not easy to trace any communication between the sanitary guard of the Premiat and the case of the lady in the calle Paysandu, so that the origin of the fever in that quarter is obscure. It was suggested that articles of bedding and clothing picked up by fishermen near the quarantine island and taken to their homes in the neighbourhood might have contained the germs of the disease. These cases, like those of all the epidemics which have been observed here, were confined to the northern slope of the town. (Dr. Brendel.)

In consequence of these cases we stopped giving the crew leave for about six weeks, a precaution which was also taken by all the other men-of-war in port. Besides the Premiat, there was yellow fever on board the German brig Emma and the American ship Granite State. But no spread of the disease took place from these vessels.

We left Montevideo on the 3d of June and arrived at Rio de Janeiro on the 20th. Yellow fever had ceased to be epidemic at Rio, there having been but six deaths of the disease in the first fortnight of the month.

The city of Rio de Janeiro is in latitude  $22^{\circ} 54'$  south, just within the tropics, and about the same distance from the equator as Havana. The city is beautifully situated on the west side of the magnificent bay of Nitherohy, at the base of a series of hills and mountains, of which Corcovado and Tijuca are the principal peaks. The city stretches along the shore of the bay in picturesque irregularity, the houses mounting the hillsides and fringing the beautiful sweeps of the beach for several miles from Bota Fogo to Ponto Caju. On the opposite shore of the bay are the towns of Nitherohy and San Domingo.

Several of the islands are covered with buildings as well; that of Cobras, where the Arsenal da Marinha is situated, and the government docks, and that of Euxadas, a coaling station, where we and the English have government store-houses.

Although Rio appears to be built upon a very hilly site when viewed from the harbour, yet the greater part of it stretches away over a perfectly flat plain. The suburbs, such as Bota Fogo, Lorangeiras, Cattete, etc., are very pretty, and abound in beautiful villas and handsome mansions, but the streets of the closely-built city are narrow, close, and generally dirty, and from the condition of a great part this quarter would seem to be the capital and metropolis of foul smells.

There are several handsome gardens and squares, of which the Passeio Publico, the Proças da Constituição, do Duque de Caixas, and da Acclamação are the principal.

The chief among the many hospitals at Rio is the Santa Casa da Misericórdia, which fronts upon the bay. This is capable of accommodating 1,200 patients. It contains 36 great wards, besides smaller ones and private chambers. The walls, floors, and

doors in these, and in all the corridors and passages, are kept brightly polished, and of course are maintained clean without dampness, from scrubbing and slopping. The nurses are Sisters of Charity; these keep the books, dispense the medicines, and, with the assistance of a few servants, do all the service of the hospital; the management is excellent. The defects noticed in the hospital were the insufficient arrangement for baths, the imperfect condition of the latrines, and a system of close boxes for foul linen in the corridors near each ward. The baths are all contained in two apartments only, so that should several persons require bathing either therapeutically, or for ordinary reasons of cleanliness, an objectionable exposure would be unavoidable. The foul-linen boxes are apt to contain, as some did, concentrated odours, and the latrines can be perceived by the olfactories at some distance. The condition of this important office in hotels, and even it is said in the greater part of the private houses in Rio, is deplorable, and astounding to a stranger, and I should fancy must be something among the factors which have made this city one of the most unhealthy in the world.

Belonging also to the Santa Casa da Misericordia is the Hospital of Dom Pedro II, at Bota Fogo, a magnificent building intended for a lunatic asylum, and containing accommodations for 300 patients. A portion of this building is devoted to the lodgment and care of the orphan children under the charge of the Santa Casa.

Another branch of the Misericordia is the hospital for contagious diseases at Gamboa, where there are 300 beds. This was quite filled during the small-pox epidemic of last winter.

There are many smaller hospitals, both public and private, among others, the Hospital dos Lazaros, especially devoted to the treatment of cases of elephantiasis.

\* \* \* \* \*

Rio is supplied with water from the Corcovado, from which it is conveyed by a fine aqueduct of stone, built in 1740. The water is of excellent quality, but the quantity, especially during the summer droughts, is often insufficient. The defective drainage is partly due to a want of water to carry off the sewage.

The company "City Improvements" are engaged in repairing and reconstructing the sewerage system.

It has been proposed to extend a long main across Bota Fogo Bay and out to sea behind the Sugar Loaf, so as to empty the city drainage into the Atlantic and clear of the harbour. Should this be done there is no doubt that the sanitary condition of the harbour would be improved.

The rise and fall of the tide in the bay is from 3 to 5 feet; when, however, southerly gales blow, the water accumulates in the bay and remains stationary, high above high-water mark sometimes for twenty-four hours. That the sewage of the city has tainted the water of the harbour no one can doubt who has perceived the foul smell in the calm nights and early mornings near the city shore.

One of the blessings of Rio, especially in the summer, is the sea-breeze, to which the soubriquet of "the Doctor" has been given. It sets in between 10 a. m. and 1 p. m., and usually dies away at sunset. There is sometimes a land-breeze at night, but this is irregular, and the nights and early mornings are generally calm, and, in the summer, very sultry.

The average temperature of Rio is said to be  $23\frac{1}{2}^{\circ}$  C. (Dr. Torres-Homem), but the average for the month of July, the coolest of the year, taken on the spar-deck of the Hartford, was  $22^{\circ}$ , with a relative humidity of 85.

The country about Rio at the base of the mountains is marshy, and large lagoons lie to the westward. Much has been done to reclaim the land and to fill up the fens and swamps in and near the city, but enough remain to account for the malarial fevers

of this locality. Intermittent, remittent, and pernicious fevers are common throughout the year, being more frequent in the summer months. Deaths from these fevers constitute one-tenth of the yearly mortality. Forty-five cases of this class of disease occurred in the fleet after exposure to malaria at this place.

The yellow fever has been epidemic in Rio at various times since 1850, when it seems to have been imported from New Orleans.

Dr. Torres-Homem (*Estudo clinico sobre as febres do Rio de Janeiro*) gives the following statistics of the mortality of the several epidemics, viz: In 1850 there were 4,160 deaths, mostly foreigners; in 1851, 475; in 1852, 1,943; in 1853, 853. From this time until 1859 there were but a few sporadic cases observed, but in that year there were 500 deaths; in 1860, 1,249; and in 1861 and 1862, 259.

"From this time on to 1873," says Dr. Torres-Homem, "there have been cases of this disease in the summer months, always grave when the victims were foreigners, and always causing a certain number of deaths."

In the summer of 1872-'73 an epidemic similar to that of 1850, occurred, and others in 1874, 1875, 1876, 1877, and 1878. In the first six months of 1876 there were 3,476 deaths from yellow fever. During the epidemic of 1878, from the 1st of November, 1877, to the 30th of April, 1878, there were 787 deaths. The disease can be considered as endemic in Rio, with frequent epidemic extensions. The northern provinces of Brazil, especially Ceara, suffered fearfully from drought and consequent famine, in the summer and autumn, to which was added an outbreak of small-pox. The distress and mortality in Ceara were frightful. Many Cearenses came to Rio and brought the small-pox with them. The deaths from that disease amounted to over 700 in the month of September.

The greatest mortality in the city of Rio is from pulmonary

diseases, which, in the year beginning June 1, 1877, and ending May 31, 1878, amounted to more than one-fifth of all the deaths. The general death-rate of the year ending June 30, 1878, was about 42 per 1,000 of the population of the city. But in the six months ending June 30, 1876, a bad yellow-fever year, the number of deaths was 9,339, giving a yearly death-rate of 68 per 1,000. So that considering the frequency of the epidemics of yellow fever, the average death-rate must be much greater than the usual estimate of 4 per cent.

It is very evident that this port is a dangerous one for a ship of war to visit during the summer months, and in epidemic yellow-fever years no ship should come here, if possible, before the 1st of June.

The ravages of the disease here are principally among the unacclimated foreigners. The following figures, taken from the reports of the physicians in charge of the yellow-fever infirmaries established by the Santa Casa da Misericórdia during the epidemic of 1876, show how out of all proportion foreigners are more susceptible to the disease than natives.\*

*Enfermaria de Santo Antonio.*—Total number of cases, 501; cured, 320; died, 181. Of these 501 there were, Brazilians, 13; foreigners, 488; foreigners of over four years' residence, 29. Of the 181 deaths there were, Brazilians, 2; foreigners, 179.

*Enfermaria de Santa Anna.*—Number of cases, 280; Brazilians, 6; foreigners, 274; foreigners of over four years' residence, 11.

*Enfermaria de Espiritu Santo.*—Number of cases, 177; Brazilians, 4; foreigners, 173. Of these there were cured, 109; died, 68. Of the cured there were Brazilians, 3.

In the *Enfermaria de Santa Rita* there were: Number of cases, 237; cured, 159; died, 78; Brazilians, 13; foreigners, 224.

\*Relatorio apresentado à mesa da Santa Casa da Misericórdia do Rio de Janeiro, pelo provedor, Conselheiro Zacarias de Eôes e Vasconcellos. Anos Compromissaes de 1873-'74 a 1876-'77.

The deaths were all of foreigners, of whom 67 had been less than a year in Brazil.

*Enfermaria de Visitação*.—Number of cases, 412; Brazilians, 9; foreigners, 403; cured, 212; died, 200. Of the deaths 8 were Brazilians.

These figures exhibit the fact that Brazilians are almost exempt from yellow fever, and that foreigners of over five years' residence enjoy almost equal immunity. As the germs of the disease are always present in Rio, newly-arrived foreigners should be on their guard, and should be careful to avoid the mid-day sun and exposure to the air and the dews of night.

The apparent dying out of the disease in April or May may be to some extent simply an indication that the pabulum of the disease, *i. e.*, unacclimated foreigners, is exhausted, and that the number of cases is diminished because the more susceptible portion of the population has disappeared.

The malarial fevers, in the pernicious, bilious, and remittent forms, are dangerous diseases, and are apt to be taken for yellow fever in the latter stages. It is better, in order to be sure to keep the germs of the latter out of ships, to send doubtful cases to the hospital, and to take proper hygienic precautions in regard to bedding and clothing.

On the 9th October the Hartford left Rio for Santos, where the ship arrived on the 11th. The Essex had left Rio for Tristan d'Acunha, Cape Town, and St. Helena, on the 21st September.

Santos is a town of about 10,000 inhabitants, a little over 200 miles to the southward and westward of Rio. It is built upon low land on the bank of an arm of the sea. The land surrounding the town is flat, covered with low woods, and honey-combed with estuaries and creeks, which make the country almost a marsh to the foot of the Serra do Mar range of mountains, about eight or nine miles away. Of course it is very malarious. The same types of fever are found here as at Rio, and in years of

epidemics of yellow fever in the latter city, the disease always finds its way hither. The appearance of the inhabitants here exhibits more than at Rio the paludal cachexy.

We left Santos on the 18th October, and arrived at Santa Catharina on the 21st. There is a large island off Santa Catharina separated from the mainland by a channel, wide at the northern entrance and diminishing toward the southern, near which is the city of Nossa Senhora do Desterro.

Our anchorage was about three-fourths of a mile from the island, and about two miles, perhaps more, from the main, and about nine miles from Desterro. Coming from Rio and Santos, and the humid warmth of those places, the change to the brisk refreshing breezes of this harbour was delightful, and indeed it seemed a very sanitarium to us. Our sick-list diminished, and there was a total cessation of fever cases. The crew seemed to enjoy roaming over the hills and fishing with the seine quite as much as going ashore at Rio. Provisions of all kinds are plentiful and cheap at St. Catharine's.

There is, however, considerable sickness here from malarial fevers. The people have a cachectic appearance, and numbers came on board for medical assistance, whose trouble arose almost invariably from malarial poisoning.

Last year (1878) there was no yellow fever here, but in 1876 or 1877, 60 cases appeared at Desterro, the disease having been brought here in a vessel from Rio.

On the 26th November we again anchored in the roads at Montevideo.

Since the last sanitary report was forwarded, the berth-deck of the Hartford has been kept varnished with shellac. For the relative humidity of this part of the ship compared with that of the open air, I refer to the atmospheric observations for the year, sent with the yearly returns.



The average number of persons in the squadron during the year was 582. The average number of sick per diem, 13.51.

Cases remaining from last year.....	13
Admitted .....	353
Discharged to duty .....	331
Invalided .....	25
Died .....	7
Remaining January 1, 1879 .....	6

Of the 25 invalided the majority were for old chronic cases contracted before the cruise began.

The following is a classification of the diseases, viz:

Miasmatic diseases .....	69
Venereal diseases .....	33
Alcoholism .....	6
Diathetic diseases .....	47
Nervous system .....	13
Circulatory system .....	1
Of the eye and ear .....	9
Respiratory system .....	37
Digestive system .....	32
Urino-genital system .....	15
Integumentary system .....	36
Tumors and cysts .....	2
Wounds, fractures, etc. ....	64
Odontalgia .....	1
Locomotive system .....	1
Total .....	369

Although we were but three and a half months at Rio yet malarial diseases are nearly double that of any other class, excluding accidents. Some of these cases, however, were brought from the United States. The number of venereal cases is small, considering how constantly the men have had liberty, and that no system of inspection is in operation, either at Rio or at Montevideo.

## U. S. S. ESSEX.

REPORT OF PASSED ASSISTANT SURGEON ANDREW M. MOORE.

The ship sailed from Hampton Roads, Virginia, August 16, 1877, having instructions to call at various ports on the west coast of Africa, *en route* to the South Atlantic Station.

In my report of January 1, 1878, all the information that could be obtained during short visits, respecting the medical topography of Madeira and the Canary and Cape de Verde Islands, deemed worthy of being recorded, was communicated to the Bureau.

Proceeding on the cruise from the last-mentioned group, the ship came to anchor October 19, 1877, at Monrovia, Liberia. This town is pleasantly located on the high ground which rises abruptly from the brink of the sea to an elevation of several hundred feet, and at the junction of a promontory of two miles in length with the main land. At the foot of the hill, and separated from it by the mouth of the St. Paul River, is the commencement of a low coast-line, whose general direction is at a right angle to the promontory. The harbor formed by this deflection of the coast-line is an open roadstead, affording hardly any security to shipping. During a two weeks' stay at this place, the vessel was distant one mile, and one mile and a half, respectively, from the high and low ground above mentioned. Every part of the country is covered with a luxurious and dense vegetation. Even the broad, unpaved streets require to be mowed once or twice a year, so prolific is the soil under the influence of heat and moisture in this climate. Growth, decay, and decomposition follow each other in rapid succession. And even if the insalubrity of the climate was not a fact of infamous notoriety, one would confidently look for pernicious forms of fever, so marked are all the conditions known to be essential to the development of malaria. It is the united testimony of the inhab-

itants that it would be unsafe for a foreigner to spend a night on shore. The populace is composed of colored emigrants from America, and their descendants. Though intermittent and remittent fevers are not infrequent among them, they suffer much less than the white race. At the foot of the town dwell the Kroos (native tribe), who seem to enjoy complete immunity from the pestilential vapors which they constantly inspire, and which are so pernicious in their effects upon foreigners. A better physique has rarely been seen in any race, and in this respect they have the advantage of the Americo-Liberians. It is well known that in temperate latitudes, length of residence in malarial districts will not always afford protection against injurious consequences. On the contrary those who have been exposed longest, *ceteris paribus*, suffer most. So deleterious is this influence, in tropical climates where malaria abounds, on the constitution of European immigrants, that the third generation generally becomes sterile through physical decay. (See Aitkin's Science and Practice of Medicine, third American from the sixth London edition, vol. 2, page 883. Persistent pernicious influence of malarial climates.) That the inhabitants of a large continent are able to withstand successfully the ordinary effects of paludal poison, is probably due to the selection, from primitive times, of individuals best fitted by nature to cope with this evil, and to the gradual extinction of the weaker, through successive generations.

While on the coast of Africa, all boating was done by Kroomen, and every precaution taken to protect the crew against the enervating influence of the climate. Awnings were spread day and night, and the usual exercises aloft suspended. Very little visiting on shore was permitted, and then only between the hours of 10 a. m. and sunset. Yet during a two weeks' stay off Monrovia, 23 of the crew were attacked with intermittent fever, of a mild type, however, and readily yielding to treat-

ment by quinia. Though it is not by any means impossible that malaria could have been conveyed from the nearest land (one mile) by atmospheric agency, it is more probable that these cases were due to exhalations from a mixture of fresh water from the St. Paul River, loaded with vegetable detritus, with salt water around the ship.

Besides the various types of fever prevalent here, chronic malarial toxæmia is, as might be expected, to be found. The American minister resident, himself a colored man, had, after repeated attacks of malarial fever, for months been a sufferer from hepatic trouble, and physical examination revealed enlargement of the liver from chronic congestion. A young clergyman and wife, missionaries from Pennsylvania, came 25 miles from the interior to visit us at Monrovia. They were typical examples of this affection—anæmic, emaciated, with pearly conjunctivæ, bronzed skin, and general debility. No doubt a microscopic examination of the blood would have brought to view numberless pigment granules.

There is no hospital at this place or medical institution of any kind.

It may not, perhaps, be out of place to mention, for the benefit of those having a taste for entomology, the habits of a certain white ant—an indigene. Though insignificant in size and general appearance, this insect is, probably, the most formidable enemy of the Monroviaans. They gain admission into the hidden recesses of the wooden walls of their houses, and, from these inaccessible retreats, noiselessly, but steadily, proceed to honey-comb every beam. Sometimes the first intimation of insecurity consists in the giving way of some portion of the wall which has been weakened by the innumerable perforations of these tireless engineers. Many of the older houses have been destroyed in this way. Since the destructive habits of this pest have become known the new edifices have been

constructed of brick and stone; the little wood necessarily used being first exposed to the action of creosote, which is said to arrest their invasion.

A Krooman—shortly after shipping for temporary service—presented himself at the sick-bay with an inflamed foot, caused by the presence of a Guinea-worm (*Filaria medinensis*), whose head was just protruding above the surface of the dorsum. Next day it had disappeared, and at the end of three days a small vesicle made its appearance beneath the internal malleolus, the rupture of which again disclosed the parasite. An unsuccessful attempt was made to extract it by winding on a small cylinder. The patient then bathed the limb freely, several times a day, in water as hot as could be borne, squeezing it at the same time from above downward. This, he said, was native practice, and it proved very successful in this case, as he relieved himself of his unwelcome guest in a few days. This parasite is unknown in Liberia. The patient stated that he had left Cape Coast Castle, on the Gold Coast, about six months previously, where he had been at work for three months. The coast of Guinea is infested with the *dracunculus*, and it is reasonably certain that the young *filaria* effected its entrance during his stay there. The period of residence in the body, before making its presence appreciable to the senses of its host, could not have been less than six nor more than nine months. A microscopic examination showed this specimen to be, as usual, of the female sex.

On the third day after arrival at Monrovia, an accident occurred on shore, which necessitated surgical interference. As it may not be without value to the profession, I herewith append a history of the case, copied from a private journal in which it was recorded at the time.

October 22, 1877, Edward Berry, colored, æt. 30, citizen of Liberia, native of Kentucky, U. S. A., while assisting in firing a salute to the American flag, and in the act of ramming home

a charge of powder, had his left hand at the wrist carried away by a premature explosion. There was also a compound comminuted fracture of the right hand and fracture of the right ulna at three points, the superior of which was five inches below the elbow. The forearms were severely burned. Shock, and the nature of the wounds, prevented dangerous hæmorrhage. When seen two hours afterwards, the unfortunate man was suffering great pain and was apprehensive of a fatal result, reaction having partially set in. There being no option, patient was etherized, and the arms amputated—the left at junction of middle and lower third; right, three inches below the elbow. After ligating arteries and closing wounds by sutures, stumps were dressed with roller bandage. Full dose of morphia at bed-time.

*October 23.*—Rested fairly during past night; temperature,  $102\frac{2}{5}$ ; pulse, 125 (anterior temporal); tongue slightly coated, thirst, anxious countenance. Repeat anodyne at bed-time. Saline next morning.

*October 24.*—Rested well; saline acted briskly once; temperature,  $101\frac{3}{5}$ ; pulse, 100; more composed. Removed bandages, and dressed amputation wounds and burns with carbolized oil.

*October 25.*—Temperature,  $102\frac{2}{5}$ ; pulse, 105; some swelling of stumps, attended with throbbing pain; removed sutures and applied adhesive strips; carbolized dressing continued; anodyne at night.

*October 26.*—Temperature,  $101\frac{1}{5}$ ; pulse, 100; slept well; more hopeful; swelling subsiding; healthy granulations springing up over burnt surface. Chloral hydrate at night; saline next day.

*October 27.*—Temperature,  $100\frac{1}{5}$ ; pulse, 90; tongue, cleaning; reports favorably; persist.

*October, 28.*—Temperature,  $106\frac{1}{5}$ ; pulse, 90; tongue, clean;

appetite, good; moderate suppuration; union taking place by first intention and by granulation. R. Vini portensis, f3ij, t. d.; beef-tea.

*October 29.*—Temperature,  $100\frac{1}{3}$ ; pulse, 90. Some sloughing in right stump, in which suppuration has been more profuse than in left. Continue.

*October 30.*—Temperature,  $99\frac{4}{5}$ ; pulse, 90. Sloughing and suppuration diminishing; healthy granulations closing up amputation wounds, where not united by first intention. Burnt surface cicatrizing.

*October 31.*—Temperature,  $99\frac{1}{5}$ ; pulse, 90; progressing favorably; persist.

The ship being under sailing orders, the patient was left in charge of an intelligent colored man, with general instructions as to future treatment, particularly as to the proper time and manner of removing ligatures. Several months afterward information was received from a Liberian merchant, trading at Rio de Janeiro, that my patient made a good recovery, and was employed as messenger by the department of state at Monrovia, besides being allowed a small pension from the government.

In closing this report, I would respectfully call the attention of the Bureau to what seems to be a serious defect in the construction of this ship. The average space between the store-room floors and the skin of the ship does not exceed 10 inches. The consequence is that the bilges often become foul in places where it is not possible to clean them properly. By raising the floors referred to a few inches higher, there would have been sufficient room for a man to enter and thoroughly clean every part, and the space thus taken from the store-rooms would not have been material. As it is, chips, shavings, etc., sealed up when the floors were laid, and left to rot in the interstices of the floor-timbers, cannot be removed except by cutting down upon them through the store-rooms.





## EUROPEAN STATION.



## EUROPEAN STATION.

### U. S. FLAG-SHIP TRENTON.

REPORT OF PASSED ASSISTANT SURGEON TALLEYRAND D.  
MYERS.

There has been no change made in the arrangement of the quarters and berthing-space in this vessel during the past year. The number of persons actually on board remains practically the same as at the commencement of that year. The cubic air-space per man is therefore the same as when my predecessor, Passed Assistant Surgeon J. W. Ross, made his report to the Bureau on the sanitary condition of the ship. The percentage of sickness is 70.50, as against 71.54+ for the year 1877, the slight improvement being doubtless due to the pleasant cruising of the vessel during the year. The percentage of deaths has been 0, a gain of .87+ per cent. over the preceding year, but as two of the three deaths of that year were the result of chronic diseases of long standing, and the remaining one from accident, the gain is only apparent.

The means of ventilation are unchanged, and at night when the ports are closed the air on both decks is very impure. As this vessel has full steam-power, and is also full rigged for sailing, space is required for stowing a full supply of material and appliances for both modes of motion. In making room for spare spars and the necessary deck-gear, encroachment is made upon the space intended for the proper ventilation of the fire-room. My predecessor called attention to the fact that the forward part of the fire-room hatch "is almost entirely closed in with the two launches and spare spars"; even when only five of the eight boilers are in use the temperature sometimes reaches

140° Fah. in the fire-room, and a few of the men have suffered from the effects of the heat. The warrant officers have excellent rooms, and the steerages are well ventilated and sufficiently lighted, but they are overcrowded. At present nineteen persons mess in and use the two apartments, which, at most, should not be occupied by more than eight. This number can only find sleeping-places by using the transoms and the mess-tables for that purpose. Seven persons are now compelled to use one washstand in the port steerage, while twelve persons use the one in the starboard-steerage. The number of lockers required to enable these gentlemen to keep their effects from becoming common property reduces the available space to a minimum. Under the circumstances, no regard can be paid to the ordinary conventionalities of life. The relation of morality to mode of life is now so well understood that it seems almost criminal to permit young men, just at the age when they are forming their habits and morals to live where they have no retreat from the excitement of constant association. The subject of morality presents itself as an important factor to the sanitarian in contemplating the causes producing disease. The great number of venereal and other diseases occurring among steerage officers, which indicate a low state of morals, may, in my opinion, be properly considered as the result of the constant association and overcrowding to which they are subjected.

During the past summer and autumn this vessel has been engaged in active cruising. Her stay in the ports visited was necessarily short. The water obtained in nearly all of these ports was either very hard or contained a large amount of organic matter, oftentimes both. When the water was questionable, as it was in nearly all of the Italian ports, and, indeed, in nearly every port we have visited, I did not hesitate to recommend the use of distilled water. The large Baird condenser on

board is capable of furnishing three thousand gallons of excellent water daily.

The articles of food constituting the regular Navy ration furnished to the crew are of excellent quality. In port fresh provisions are issued four times each week, and the bumboats are permitted to supply fruit and other delicacies that are not regarded as hurtful by the medical officer on duty. The food is only fairly cooked, and is served to the men on the old-fashioned mess-cloths. Great improvement can be made in the manner of serving. Many of the French men-of-war, carrying quite as many men as this ship, are supplied with swinging tables for the crew. The enlistment and training of boys has resulted already in an improvement in the general character of the crews of most of our vessels. If there ever is a time when every effort should be made to improve the condition of our men, it is before the prejudices and superstitions of the old man-of-war'sman have taken deep root; while the knife and fork, and even the tooth-brush, are kindly remembered; and before intelligent, manly dispositions are degraded into the semi-brutes of the olden times. The old mess-cloth is undoubtedly a relic of barbarism and should give place to the swinging mess-table. The strongest objection to the change is the want of space for stowing the tables, but this objection has been obviated in French war-vessels, and there is no good reason why it should not be in our own. The meal-hours are too close together. At present breakfast is served at 8 a. m., dinner at 12 m., and supper at 4 p. m. Breakfast should be at least an hour earlier, and supper two hours later than the hours now fixed for these meals. This arrangement would more equally distribute the food taken during the day.

The men on board this vessel are well supplied with clothing.

Each man is required to have three suits of blue; he is also required to have at least three changes of underclothing, and

enough white clothes to keep himself clean and dry when white is worn. Regular inspections of the clothing-bags are made by the division officers. How thorough these inspections are I am unable to say. I would suggest that the senior medical officer be ordered to make a monthly inspection of the clothing of the men and report directly to the commanding officer the results of his observations.

The general condition of the Trenton is so much better than that of any other vessel on board of which I have served, I regret that duty has compelled me to call your attention to the imperfections noted in the foregoing pages. In conclusion I beg leave to state that credit is due the executive officer for the splendid condition of the vessel, and for the careful attention he gives to all matters pertaining to the hygienic condition of the ship.

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U. S. S. GETTYSBURG.

REPORT OF ASSISTANT SURGEON SAMUEL H. DICKSON.

Complement of officers and men, 101. Cubic feet of air-space per man on berth-deck about 117. Six patients can occupy the sick-bay comfortably, giving 168 cubic feet to each one. Cubic feet on forecastle, per man, in port, 192, at sea, 248. Wardroom country used constantly by six officers, 260 cubic feet apiece. The six state-rooms opening into the wardroom average 272. Steerage country contains 900 cubic feet, but from its position it is not used as quarters. Starboard steerage state-room has one officer; cubic feet, 357. Port steerage state-room, two persons occupying it, 161 apiece. Cabin contains about 2,500; starboard state-room, 225; port, 400. The executive officer's room on the hurricane-deck has 393 cubic feet, and a room under the hurricane-deck, occupied by the chief engineer, 314. Percentage of sickness, 3.56; mortality, 0.

The general amount of ventilation throughout the ship is quite fair. To particularize, the berth-deck has opening into it a hatch 6 feet by 6 feet 3 inches, which, in good weather, is always left open, thus affording a good supply of air below. In wet weather it is obliged to be covered by a hood, as it is entirely exposed, and then the air-supply is necessarily more limited in amount. There are eleven 8-inch air-ports on this deck, kept open in port, should weather permit, and, as they are well above the water-line, sometimes even at sea. Aft the hatch spoken of there is no direct ventilation, and this portion of the berth-deck is apt to become a little foul. The brig, which is located there, is often very damp. The sick-bay is well ventilated, in part by the berth-deck, into which it opens, by a hatch 4 feet square, covered usually by a grating opening from the fore-castle, and by four 8-inch air-ports, which can be opened in smooth weather. There is also a 12-inch ventilator leading from the general store-room, just forward of the sick-bay, into which it opens, and extending some 5 feet above the top-gallant fore-castle. This is a valuable addition to the ventilation of the whole deck. It is the principal outlet, and there is nearly always a strong draught passing through it. The fore-castle is well ventilated in port, badly at sea, when everything forward is closed, and very frequently a curtain up aft; the galley is also here. There are ten 7-inch air-ports, four gun-ports, and one hatch 4 feet square in this part of the ship. The wardroom is well ventilated, particularly so in port, when the large air-ports in the state-rooms are open; it is also possible to keep these open at sea under favorable circumstances. There are nine 9-inch air-ports and one skylight 34 by 43 inches. The large companion-ladder hatch in the steerage also supplies air to the wardroom, the doors between being always open. Two wardroom state-rooms have two air-ports, the rest one each; ventilation good. Starboard steerage

state-room four air-ports, port steerage state-room two air-ports; ventilation not good at sea. Cabin ventilation excellent in port, poor at sea in bad weather when the skylights and hatch are closed. Besides the large accommodation-hatch there are two skylights, one 34 by 43 inches, the other 60 by 36 inches, and sixteen 9-inch air-ports. The executive officer's room has windows on all sides, and the chief engineer's two windows 2 feet square; both apartments are, in consequence, well ventilated. The other parts of the ship, as the engine and fire rooms, are well supplied with air.

The amount of light supplied through the hatches, skylights, and numerous air-ports is abundant and sufficient for all purposes.

Warming is by means of steam-heaters on the berth-deck, sick-bay, steerage, wardroom, and cabin, executive officer's and chief engineer's rooms, and by the galley in the forecabin. There is abundance of heat, except in the forecabin; the galley being so far aft cannot heat the forward part.

Good potable water has been supplied to us at the ports where the vessel has touched. It has also been distilled on board, of excellent quality. The capacity of our distiller is about 1,000 gallons a day. Means of preservation, four iron tanks, usually kept whitewashed, holding 1,640 gallons. Daily consumption of water about 180 gallons.

When in port the men receive fresh meat and vegetables nearly every day; at sea, the usual liberal Navy ration, and generally well prepared.

The bilges of this ship are in excellent condition. They have lately had a thorough overhauling, and it was astonishing to see the amount of filth extracted from them, especially from beneath the engines. A new planking has been laid, and every means will be taken in the future to render this part of a ship, so often neglected, sweet and clean. There is much



fault to be found with the construction of the "head." It is in the port gangway of the ship, and smells at times so abominably as to taint the air as far aft as the quarter-deck, and this despite every effort at cleaning or disinfecting it. Instead of the long wooden box which now receives the deposits, and is flushed several times a day, I would suggest that it be replaced by a water-closet similar to those used by the officers, with three bowls.

*Medical topography.*—Pursuing the work of survey of the Mediterranean and its coasts, the Gettysburg has been very busily employed, and many ports have been visited. I submit the following information relative to those of most importance.

*Malta.*—The island of Malta is some seventeen miles long by eight wide, and, according to a recent census, contains a population of 135,000. It is principally composed of a soft, yellow, porous sandstone, resting on limestone, which cuts readily when first quarried, but hardening subsequently on exposure to the air. A granite is also found, but not in large quantity. Across the island, forming a sort of backbone as it were, run the Bengamma Hills, and from the numerous springs found in them is derived the principal water-supply of Valetta, the chief town, and the *casals* on the east side of the grand harbor. Led into these places by ancient aqueducts it is distributed by fountains and stored in tanks. This water is of excellent quality, but not very abundant; it is furthermore wasted, leaking through the aqueducts in transit. Cisterns are in common use, as well, and it is owing to the porous material of which they are built, and the proximity of cesspools and drains, that the water they contain is so often contaminated and made the vehicle for the introduction, into the systems of those who drink it, of morbid matters. Typhoid fever and a hybrid form called typho-malarial or faeco-malarial, of late years quite common, undoubtedly arise from this cause, as well as

from the bad drainage of the island. Heretofore the sewage has flowed into the harbors, where, owing to the want of tide and current, it was apt to accumulate and back up into the creeks. We noticed this in the spring of the year, when we were lying at the head of French Creek. An immense improvement has since taken place, I am informed, by the opening of a new sewer draining the towns or *casals* on the east side of the grand harbor, for it leads the sewage some two miles outside the harbor, and finally empties it into the sea, where a constant current carries it off. Valetta has not yet been included in this new system, and the state of affairs there is as bad as ever. From the anti-hygienic manner in which the houses in Malta are constructed, with regard to ventilation, and the defects from the nature of the materials of which they are built, the overcrowding of the population, and the exhalations from privies and bad drains, it is not to be wondered at that the low forms of fever spoken of are so generally <sup>now</sup> prevalent. The mortality in years free from epidemics is highest in summer and autumn and lowest in spring. In the spring of this year it was 19.01 per 1,000 of population. The annual mortality for 1876 was 22.8 per 1,000, and the chief causes of death for that year as follows: Enteritis, 14 per cent.; atrophy and debility, 10 per cent.; bronchitis and pneumonia, 11.5 per cent.; heart disease, 6.5 per cent.; typhoid, 1.6 per cent.; phthisis, 3.6 per cent.; diphtheria, 2.2 per cent. The latter disease first appeared on the island in 1859, increased to 1874, since which time it has been gradually declining. In the summer and autumn the principal diseases are disorders of the bowels and liver, typhoid and other fevers. Long-lived people are rare in Malta; the greater number die under seventy-five years of age, 50 per cent. being children under five years of age. During the short stay of the ship in Malta in October, small-pox, of a benign type, was prevailing. Some 52 cases had been reported from June 12 up to October

7, nine proving fatal. Each house containing a small-pox patient was closely guarded and put in quarantine. Vaccination is compulsory on the island. The climate of Malta during the winter and spring months is very genial and pleasant; in summer the heat is intense. Invalids from England with weak chests often winter in Malta, but of late the fear of fever has driven many to Algiers. I transmit herewith a daily meteorological register, dating from January 1, 1877, to March 31, 1878, of Malta, for which I am indebted to Captain Stevens, R. N., who kindly had it copied from the record of Her Majesty's ship *Hibernia*. There are two municipal hospitals in Malta—the Central Hospital and Santo Spirito—neither deserving of special mention. The Royal Naval Hospital, besides being one of the largest English foreign hospitals, is decidedly the best in Malta. It has a most commanding and salubrious position on Bigli promontory, is liberally and ably managed, the best care and attention being given to the sick in its wards. I omit any description of the building, etc., since it has been already fully reported on in vol. 3, Sanitary Reports. The Cottonera Military Hospital stands on very high ground on the opposite side of the harbor from Valetta. It is built of Maltese stone, and consists of a square centre building, with four wards running off from it, two on each story. Ventilation good by numerous windows and apertures near the floor; beds and bedding clean and comfortable. The floors are of stone, well waxed; the water-closet arrangements admirable. Capacity of the hospital, 160; average number of patients, 90. It has only been occupied some three years. The Valetta Station Hospital is the old hospital of the Knights of Malta, and was built in 1628. It is a most irregularly fashioned building, difficult to describe; its position disadvantageous, wards dark and cheerless, though clean and fairly ventilated. During the year 1877 2,825 patients were under treatment, of whom 2,672 were discharged, while 14 died,

and 139 remained under treatment. There is also an excellent convalescent hospital on the road to Citta Vecchia. There is a university in Malta in good standing, with faculties having professorships in philosophy and arts, medicine, theology, and law. In the faculty of medicine are five professors—of medicine, of anatomy and surgery, of midwifery, of chemistry, of botany. Physiology and hygiene are taught from the chair of medicine; natural history and medical jurisprudence by the professor of botany. The course is four years. First year, anatomy, natural history, chemistry; second year, physiology and hygiene, surgical institutes and practical anatomy, *materia medica*; third year, pathology and practical medicine, surgical operations, midwifery and puerperal diseases; fourth year, clinical medicine, clinical surgery, medical jurisprudence. At the end of each year the students are examined on the subjects pursued. For matriculation the applicant must either exhibit a diploma as master of philosophy and arts obtained from the university, or undergo an examination as to his proficiency. The class is very small, composed only of the youth of Malta who have been educated at the university. There is a good botanical garden for their use.

From Malta the Gettysburg passed over to the Barbary coast and reached Tripoli on January 12, remaining there until the 16th. The weather was very unfavorable most of our stay—rain with fresh winds.

*Tripoli.*—The winter climate of Tripoli is mild and pleasant, but during the summer months the heat is excessive. The town was in a filthy condition, some of the streets being almost impassable, owing to the accumulation of garbage and mud. There is no drainage to speak of; indeed, no attention to any sanitary measures by the incompetent local government. There is but one English physician in the town, Dr. Dickson, who kindly gave me all the information I sought. I found one

civil hospital, which is a small, but an exceedingly neat, clean, and well-ventilated establishment, containing some thirty beds, and under the care of Sisters of Charity. All strangers, irrespective of creed or nationality, are admitted, the poor gratis, while others are charged 2 francs a day. There is a military hospital, out of town, which I did not visit. Of diseases, ophthalmia is very common in the summer from the heat, the glare from the sand, the sand itself, and the dampness. As the natives rarely consult a doctor until the disease has become very severe, many lose their sight, and it is pitiable to see the number of blind and weak-eyed people in the streets. Small-pox is rare now; occasionally a case or two may be met with. The last epidemic was in 1870-'71, when the disease carried off numbers of Arabs. Previous to this the natives had resisted vaccination, but seeing how those who were thus protected among the Europeans escaped, they began to believe in it, and are now, on the least suspicion of danger, among the most eager for the operation. The gradual extinction of the disease can justly be attributed to this change of public feeling. Typhoid fever is rare. Diphtheria made its first appearance a few years ago, brought, it is said, from Alexandria, but is now disappearing. Venereal diseases are not uncommon. Scrofula common among the natives. The mortality from phthisis is increasing, especially among the blacks, and the Europeans are not free from it. There is no way of arriving at any actual per cent. of deaths in Tripoli.

From Tripoli we proceeded along the African coast, touching at Zouaga, Kabes, Sphax, and Mehediah. At the latter place small-pox was prevailing, causing a mortality, I was informed, of five persons daily, out of a supposed population of 5,000. We remained there but a few hours. We finally reached Goletta, Bay of Tunis, on January 25, and, excepting a short run to render assistance to a wrecked vessel, remained there

until February 7. The weather was extremely stormy and inclement, with cold northwest winds. Trapani, in Sicily, a town of some 36,000 inhabitants, was next visited, but the stay of a day was too limited for the collection of medical information and visiting hospitals. However, I found it a clean and well-drained town, most refreshing to eye and nostril after our recent experience in African towns.

*Palermo.*—On February 9 we were at Palermo, the most important Sicilian city, containing a population of nearly 200,000, and well named "La Felice" on account of its magnificent situation and delightful climate. It lies in a fertile and well-wooded plain, stretching down to the sea, and ascending to the foot of a chain of mountains, which form, as it were, a background to it. The climate is a very equable one; the temperature averages 52° Fah. in January; in summer the heat is considerable. Pulmonary complaints would be benefited by a winter here. Sanitary condition of the city very good; water-supply abundant, and of good quality. The health of the city was very good; indeed there are no diseases peculiar to it; malarial fevers prevail, as in other ports of the Mediterranean. Palermo possesses two municipal hospitals, and one military. The Hospital San Francisco Savario is situated at the southern extremity and in too crowded a section of the city. It was formerly a monastery, which has been very ingeniously adapted to its present purpose. The building is quite large, quadrangular in shape, the centre court being laid out as a garden. The kitchen, offices, etc., occupy the ground-floor, while a broad staircase leads to the wards on the second and third stories. There are four surgical wards, three medical, two lying-in, and one for children; there is also a venereal section, and one for skin diseases, besides several appendices, the charge of the latter falling to some charitable brotherhood. Ventilation sufficient by windows opening both on the streets and on the centre court, besides

square openings near the floor, between the beds. Beds are well apart, and they and the bedding comfortable and clean. The floors are laid in red-brick tiles, the walls yellow-washed. Diet is liberal, and varied at the discretion of the attending physician. Maccaroni is largely used and a wholesome red wine. Food is brought up for distribution from the kitchen by steam-elevators. There are 540 beds in all, the usual number of patients under treatment, 500. The dispensary is well supplied, and kept in excellent order. A large room is appropriated to the keeping of instruments and surgical appliances. They were in admirable condition, and included the latest inventions. I was struck by the neat and skilful manner in which the various surgical dressings were adapted in the wards. Connected with this institution are twenty-five physicians and surgeons, the most reputed in Palermo. Sick from our Navy would be received at the moderate price of two francs (about forty cents) a day. Special accommodations, in private rooms, five francs (a dollar) a day. The Hospital Concezione is in the western section of the city, and formerly a convent. It is more cheerful, but not so complete in its appointments as the other hospital. There are accommodations for about 200 patients of both sexes, and that number is nearly always under treatment. A feature here is a small pavilion hospital, occupying a cleared space in the pretty garden. It holds about 20 beds, is scrupulously neat and clean; a light wooden structure with wide doors at each end, and many windows; ventilation was perfect. It had lately been erected, and patients placed there did much better than in the main building.

The Gettysburg left Palermo, March 5, and proceeded to Messina, where a stay of two days was made. Malta was then revisited, where certain repairs detained us until the 20th of May. On May 21 we went to the north coast of Africa, remaining for about a week off Zouaga. The weather was in-

tensely warm during the time occupied in the survey of this place, but the health of the ship's company remained excellent in spite of the necessary exposure to the sun. The thermometer frequently registered 103°·5 Fah., and even at times as high as 109° Fah., falling at evening to 71° Fah. Stopping a day in Tripoli, we followed the coast, touching at the village of Koumz. Soundings were afterward made in the Gulf of Sidra to the middle of June, when we reached the small town of Ben Ghazi, containing 15,000 inhabitants. It is an exceedingly dirty place, the filthy lanes encumbered with rubbish and garbage, under the very windows of the houses. The water of the town from cisterns is bad; drinking-water is brought from springs some distance away, in skins and breakers. There is but one small and wretchedly-appointed hospital here, belonging to the garrison. It was filled with Turkish soldiers suffering mainly from fevers, typhoid and malarial. On June 20 we left Ben Ghazi, and arrived in Derna three days later. This town is literally buried in a dense grove of palms, fig-trees, bananas, apricot and pear trees, a real garden strip of ground. But the houses are principally mere hovels of rough stones, and the lanes full of filth. Derna has an immense advantage over the neighboring towns of the coast, in possessing an unfailing supply of most excellent water, reaching it by an aqueduct from the hills, and passing through the principal thoroughfare.

The Gettysburg reached Alexandria, June 29, and remained in port until July 15.

*Alexandria.*—This city, chiefly built on an isthmus formed by alluvial deposit, lies so low and is so surrounded by water, that its climate is an exceedingly damp one; during our visit the dews were especially heavy, soaking the ground. A residence here would be prejudicial to the phthisical, who would, however, find in Cairo a peculiarly dry and well-adapted cli-



mate. Owing to the lowness of the Nile, the water in the canal from which the city is supplied was so muddy as to be hardly fit to drink, and was accredited with a good deal of the sickness then prevailing in the way of gastric and intestinal complaints; on this account no water was received on board from shore. When the Nile rises the water is considered exceptionally good, and affects no one injuriously. The health of the city was not very satisfactory; though no disease was prevailing in an epidemic form, there were numerous cases of fever, malarial and enteric and diphtheria, besides the affections above spoken of as probably due to a poor quality of drinking-water. The autumn is considered as the most unhealthy season of the year. Of prevailing diseases ophthalmia heads the list, and is almost entirely confined to the native population. Produced by climatic influences and fostered by uncleanness, the disease generally reaches such a stage before the patient applies for treatment, that it is rarely of any avail; total blindness commonly results. Scrofula in its worst forms is met with, and syphilis is quite common. Paludal fevers exist in great variety, and typhoid is by no means unusual. Stone in the bladder is frequent, and the concretions attain the most remarkable size and shape. Elephantiasis is not uncommon. I witnessed the removal of a diseased scrotum, by Dr. Mackie, of the German Hospital, which weighed 70 pounds. The weight of the patient was 220 pounds. The Esmarch bandage was used, and there was comparatively little hemorrhage. The testicles were first enucleated; the right one was found to be the seat of a large hydrocele. The hospitals offer an excellent field for the study of liver abscess. What is called the Frank or European quarter of Alexandria, is clean and fairly paved, but the bazaars, and the labyrinth of small streets in the native sections are foul and badly ventilated—perfect hotbeds for the propagation of disease. The proper draining of the city is now agitating the

board of health, the difficulty of the undertaking arising from the situation of the city. The present system is very bad; drains lead and empty into the head of the harbor, a basin, at the principal landing-place, and the stench poisons the air for some distance around. There are four hospitals in Alexandria, the European, Greek, native or Arab, and the Deaconesses' or German Hospital. The first has a capacity of 300; the Greek and native, 200; the German, 100. The latter is the best; it is situated a little outside the city, is comparatively new, and very well constructed of stone, and conveniently arranged. It is a two-storied building, with two wings running back from the main edifice. There are a number of large rooms containing from two to six beds; no large ward. Utmost cleanliness was noticed, ventilation was good, and every comfort was at hand. The nursing, duties of pharmacist, etc., in fact the general care of the hospital, devolve upon a German sisterhood, the Deaconesses of Kaiserswerth, trained nurses familiar with their work. The establishment is supported by contributions from the Prussian and English Governments, municipality, and from private sources. There are a certain number of free beds, while those able to pay are charged two shillings (fifty cents) a day. In the private rooms, which are very well furnished, a charge of four to ten shillings a day is made. Persons of any nationality or religion are admitted. A very large number of natives attend the almost daily clinics of the two physicians attached to the hospital; they receive medicine and surgical care gratis. The total number of out patients in 1877 was 14,317. A list of operations performed in hospital and out-patient department during 1877 is appended. I would acknowledge my indebtedness to the English surgeon, Dr. Mackie, for many courtesies.

## DEACONESSSES' HOSPITAL, ALEXANDRIA.

*Operations performed by Dr. Mackie, assisted by Dr. Dove, during the year ended 1877.*

Operations.	No.	Operations.	No.
Lateral lithotomy .....	21	Ligature of hæmorrhoids .....	1
Amputation of leg above knee .....	2	Trephining (case of compound commi- nuted fracture of skull) .....	1
Amputation of leg below knee .....	1	Tracheotomy (tumour in adult) .....	1
Amputation of foot (metatarsal) .....	4	Ranula (punctured and seton passed) ..	1
Amputation of big toe .....	1	Excision of eyeball .....	3
Radical cure of hernia (Wood's) .....	3	Cataract .....	4
Amputation of breast (scirrhous) .....	1	Removal of cancer of upper and lower lip .....	1
Excision of necrosis of fibula .....	1	Removal of epithelioma of face and lower lip .....	1
Reduction of dislocation of humerus (4 weeks) .....	1	Excision of fibroid tumour in neck .....	1
Reduction of finger and compound fracture of forearm .....	1	Excision of epitheliomatous tumour of superior eyelid .....	1
Fistula in ano .....	1		
Circumcision .....	4	Total number (treated in hospital after operation) .....	59
Hydrocele punctured and injected with tincture of iodine .....	2		
Castration .....	1		

*Operations performed by the same in the out-patient department.*

Operations.	No.	Operations.	No.
Excision of eyeball .....	13	Puncture of liver abscess .....	4
Iridectomy .....	18	Paracentesis abdominis .....	20
Excision of staphyloma .....	7	Paracentesis (ovarian) .....	1
Cataract .....	1	Extraction of calculus from urethra .....	1
Pterygium .....	4	Extraction of sequestra .....	1
Trichiasis .....	93	Evulsion of polypus (nasal) .....	1
Distichiasis .....	12	Excision of cysts and tumours .....	10
Stricture of lacrymal canal dilated by incision .....	5	Lithotomy (child) .....	1
Epithelioma palpebræ .....	1	Hydroceles (punctured, etc.) .....	192
Amputation of finger .....	5	Hæmatocele (scrotal, punctured) .....	8
Amputation of toe .....	1	Fissure of rectum .....	8
Amputation of tonsils .....	2	Fistula in ano .....	43
Fracture of arm .....	1	Ligature of hæmorrhoids .....	18
Dislocation of finger .....	1	Circumcision .....	1
Dislocation of jaw .....	1		
Tracheotomy .....	2	Total .....	477

Number of patients seen, 14,317.

From Alexandria the Gettysburg went to Villefranche, where we remained some weeks, and then to Toulon for repairs, returning to Villefranche in the early part of September. I would state that a report on Toulon, its hospitals, etc., as well as on Nice, was made on a previous visit in 1877. We finally left Villefranche on September 17, for the United States, but on

reaching the straits we were turned east again. Malta was touched at on the way to Egypt, and Port Said reached on October 13. During our stay of ten days in this port the weather was very warm. The shore is very low, and the town being built on a sandy plain, and without drains, its sanitary condition is deplorable. The sewage and excrementitious matters of all kinds are simply allowed to flow off, if they will, or disappear in the soil. The health of the place is bad, but as no statistics are kept I could not arrive at any definite idea of the actual mortality. In March, April, and May it is particularly unhealthy, as then fevers, malarial and typhoid, prevail extensively. There is always some small-pox, besides diarrhoeas, dysenteries, croup, and diphtheria. Two years ago variola was very fatal in Port Said, and there was not a crust of vaccine virus to be had in the town. I found quite a neat little hospital in Port Said, the Egyptian Government Hospital, placed a little outside of the town, facing seaward, and having connected with it an extensive and handsome garden. It is under the care of a German physician, who has accomplished a great deal with the very limited means at his disposal. The main edifice is of stone and wood, two-storied. There is accommodation for 60 sick. There are three classes of apartments, the first class being in the upper story and consisting of neat, clean, and well-ventilated rooms, well provided with furniture, plain but comfortable. On the ground-floor are a few other rooms, neither so large nor so well appointed, which are classed as second class. The third class are beds, ten in number, in a poorly-ventilated, shabby ward, the beds and bedding of a very ordinary description. The charges, in order, are eight francs, six francs, and four francs a day. Across the court-yard, in a detached one-storied building, are two wards for poor natives and sick soldiers, badly aired and unclean. Nursing, cooking, and general care of sick are in the hands of the Sisters

of Charity. The water-supply of Port Said is fairly abundant and of good quality. It is somewhat muddy and needs to be filtered for use. It is pumped into the town through a double row of iron pipes from the fresh-water canal at Ismailia, forty miles distant, stored in a reservoir and distributed through the streets by hydrants, and introduced into some of the dwellings. It is Nile water.

From Port Said the Gettysburg went to Jaffa, then to Haifa, and arrived at Beirut on November 4.

*Horta, Island of Fayal.*—There is but one hospital in this port, occupying the old church and monastery of St. Francis. It is poorly adapted to the purpose. The wards are long, low, and ill ventilated, walls whitewashed, floors of soft deal—not very clean. The appointments are of the roughest description, no modern conveniences being found in the establishment. The portion of the building allotted to Americans and English is not so clean and even worse ventilated than the rest of the hospital, being but a large room with small, low windows. Green moss was growing luxuriantly on the stone window-seats, and a general dampness pervaded the place. There was a decided fecal odor, both in the ward and in the corridor leading to it. This ward would probably contain eight persons. The bedsteads are iron, with one hard straw mattress and two hard straw pillows. I would hesitate to send really ill men to such a locality. I am informed that the management of the hospital is at present bad. The medical staff consists of three Portuguese physicians, graduates of the Caémбра and Lisbon medical schools, who stand well in the town, and of one English physician, who attends the American and English ward. The capacity of the hospital is about 60 patients. Foreigners are admitted by order from consul; natives, if poor, by certificate of poverty from regidor or from vicar of parish. The charge for foreigners is 72 cents a day, exclusive of nurse's fee and medical

attendance; the former averaging about 5 cents a day, the latter from 40 to 50 cents a day. Natives, not paupers, pay from 20 to 40 cents per diem, according to treatment. There are a few private rooms for hire. The fees are collected monthly, or on departure of patient, if occurring within the month.

The quarantine laws are the same as at Lisbon. There is no quarantine station at present, but a lazaretto is being talked of. It would be erected on Monte da Guia, the bluff south of the town. Vessels in quarantine lie merely outside of the other shipping in Horta Bay. Vessels without medical officers are not admitted to pratique, unless they have clean bills of health, without at first undergoing three to five days' quarantine, even if one hundred and fifty days out. Vessels from infected ports, unless in ballast and having surgeons, are sent to Lisbon, if they are in a condition for the voyage; if not, the cargo is discharged at an isolated store-house, and the vessel, after performing eight days' quarantine, is admitted. Vessels from suspected ports, with clean bills of health, and no surgeon, are subjected to three days' observation.

The sanitary condition of the town and port is good. The streets, though narrow, are well paved and kept fairly clean. Drainage is good. The custom still obtains of whitewashing the outsides of the houses once a year. I should judge from the humidity of the climate that the interiors would be generally damp. The prevailing diseases are of pulmonary, rheumatic, and venereal nature, but I understand that the general health of the place is excellent. There have been occasional visitations of small-pox, but no contagious disease of any kind prevails at present. No unhealthy season, as such, exists here. In general terms the "recommendations or precautions necessary to prevent diseases or their spread on board of vessels visiting this port" would be fumigations and strict attention to cleanliness, with isolation of infected persons; special indications to be correspondingly met.

The inhabitants, Portuguese, are sturdy and hardy enough, and are generally intelligent, peaceful, and well-mannered.

The system of education appears to be sufficiently thorough. There is a lyceum in the town, having a sort of preparatory school and primary schools in all the parishes; there are also three night-schools kept up at the expense of the Freemasons. There are no institutions of art, science, or industry.

*Gibraltar.*—There are no marine hospitals at Gibraltar where sick American seamen or marines are admitted, but they are received without any difficulty at the Civil and Military Hospitals.

The former institution is situated in the centre of the city, on a projecting eminence on the western slope of the rock. It commands a fine view of the bay. Its position offers advantages in the way of efficient drainage and a bright prospect. It occupies an old English barrack, which has been well adapted to the purposes of a hospital, considerable additions and improvements having been made since 1815, when it was appropriated to its present purpose. It is an irregular building, separated into three divisions, Protestant, Catholic, and Hebrew, each under the management of gentlemen chosen from these different religions. The wards are clean and well ventilated by numerous windows, which, owing to the mildness of the climate, average thermometer being 64° Fah., can be almost constantly left open. The beds and bedding are all that can be desired. The culinary arrangements are rather deficient, but one cook for two divisions, the Hebrews having a separate kitchen. The diet-list is quite liberal in its provisions. The supply of water is abundant, and no necessity therefore exists for the abominable condition of the water-closets. There is no separate arrangement made for the reception of patients with contagious diseases, isolation as far as practicable being attempted in a distant ward. An effort is being made to raise

funds for the erection of a small-pox hospital. The funds for the maintenance of the Civil Hospital are derived partly from a collection on port dues, which usually amounts to £400 yearly. Every vessel anchoring in the bay pays two shillings to the hospital. Besides this, the expenses of each division are met by contributions from the religious denomination controlling it, and bequests and contributions in general are frequently made. The institution is conducted on a scale of great liberality. Its capacity is from 80 to 100, the average number of patients in healthy years being about 60. There are two resident surgeons, the senior medical officer of the garrison being consulting surgeon. No operation of any moment can be undertaken without his sanction and authority. All are in excellent professional standing. The best attention is given to the patients.

The Military Hospital is situated toward the southern portion of the rock and on its western slope. Although it belongs to the Admiralty, it is at present used by the military authorities. Its capacity is 300, but now it contains but 180 sick. The building is quadrangular, built of stone, with a central court-yard, a piazza extending around the upper wards. The wards, of which there are a number, are generally small, with whitewashed walls, and clean scoured floors. The ventilation is good, by means of air-shafts and open grates, which latter serve for heating the wards in the cold season. About 1,400 cubic feet are allotted to each patient. Bedsteads are of iron, with sacking bottoms. The custom prevails of requiring every patient who is able to be about to fold up his mattress and bedding and place them at the foot of the bed. This prevents the usual and inevitable lolling on them, and is, in my opinion, a good practice. A remote ward is used for contagious cases.

In neither of the hospitals is any provision made for caring for insane patients, nor is there any asylum in the city. There is a padded room at the Civil Hospital where patients, wild with *delirium tremens*, are placed.



As before mentioned, no difficulty obtains in introducing a sick American seaman or marine, or a sailor of any nationality, into the Civil Hospital. The charge is 50 cents a day, which includes everything. Extra nurses cost from 3 to 4 shillings per diem. Permission for our men to enter the Military Hospital has been and could be obtained from the proper military authorities; but the better and most usual plan is to put them in the Civil Hospital, where equal advantages exist.

The quarantine laws, though strictly carried out here, are not particularly obnoxious, and the service is managed in a sensible and prompt manner. There is a special act of Parliament relating thereto, a few of its provisions I insert. All ordinary matters regarding quarantine rest with the captain of the port, cases of difficulty being under the jurisdiction of a board of health, consisting of the governor, colonial secretary, the chief medical officer of the garrison, the captain of the port, and the police magistrate. Vessels coming from the west coast of Africa, between 30° north and 20° south latitude, and adjacent islands, Canary Islands excepted, are not admitted to the port under ordinary circumstances. At times, and under strict quarantine regulations, they are permitted to take in supplies and water if they are in great need. Vessels coming from the West Indies, or that part of America between the equator and 34° north latitude, between July 1 and November 15, are not admitted. If arriving between November 16 and 31 they must perform a quarantine of observation until December 1. From other parts of the world a clean bill of health from clearing point, with the statement that "no suspicious communication has occurred at sea, nor has the vessel touched at any infected port," entitles to immediate pratique.

There is no regular quarantine station; infected vessels, or those under observation, merely lie removed and outside of the other shipping in the bay, with distinguishing flag at the fore.

In addition to the port dues the following charges are made when a vessel is put in quarantine: Two dollars at once, and for every day's attendance by a health guard, when embarked, \$1; for every visit by a health guard to a vessel in quarantine, 50 cents; for every day's attendance by a health guard in superintending the discharge of a vessel in quarantine, \$2; for every bill of health, \$1.

The sanitary condition of the town and port is good, better than it has been for some years. With the exception of one case of small-pox, out of a ship from Carthagena, and under treatment at the Civil Hospital, no disease of a contagious or infectious nature is at present existing. The town is drained by means of earthen pipes, emptying into the bay. The diameter of these tubes is not sufficient. At times during heavy rains they become clogged and burst, giving vent to foul gases, and, inundating the immediate neighborhood. The supply of water is at present abundant. Formerly the inhabitants had to depend almost exclusively upon the rainfall to fill their cisterns, and for their general supply, and during some seasons this was so small as to occasion great scarcity, notably so during an epidemic of small-pox some years ago. Now, wells have been sunk on the neutral ground, and 120,000 gallons of good potable water are pumped up by engines into Gibraltar daily. Great necessity yet remains for improvement in the hygienic condition of the town. There are very many dwellings occupied by the poorer classes, which are greatly overcrowded and badly drained. In the "patios" one sees donkeys, pigs, and goats domesticated; the filth from them, allowed to accumulate, renders the air in that vicinity anything but healthful and invigorating. As early as the year 1649 epidemics ravaged Gibraltar. In 1727 a violent form of fever prevailed, which was especially fatal among the troops, and in 1798 and 1804 yellow fever of a malignant type occurred, sweeping away

in the latter year 6,000 persons. It reappeared in 1810, 1813, 1814, and 1828. It was supposed to have originated in the town itself. Small-pox has also been epidemic. The compulsory-vaccination law is in force here. In 1865 Asiatic cholera carried off a number, the deaths averaging 50 per cent. In view of these past calamities, and of the fact that 15,000 persons have to be accommodated in a space a little over a mile square, it behooves the civil and military authorities to be very particular in maintaining a high standard of cleanliness in Gibraltar. The average death-rate per thousand of population, even now, is high, being twenty-three.

The prevailing diseases are principally affections of the lungs, rheumatism, and low forms of fevers; the two former being generally met with during the winter season, the latter in summer. Febrile affections are prone to be intractable, convalescence from them being very tedious and protracted. No special recommendations occur to me as to precautions necessary to prevent diseases or their spread on board of vessels entering the harbor, beyond those mentioned in my last report.

It is difficult in so cosmopolitan a place as Gibraltar to give much of an idea as to the general character of its inhabitants, physically, intellectually, and morally considered, without being too profuse. Here we find Britons, native Jews, Barbary Jews, Spaniards, Genoese, Portuguese, Italians, Germans, French, and Moors, all retaining their national peculiarities to a great extent; besides these we have the garrison of nearly 6,000 troops. The natives are said to be idle, dissolute, and phlegmatic. Among the foreigners, the Portuguese, the Genoese, and the Gallicans are intelligent and hardworking. The Jews are shrewd and crafty, forming the major part of the commercial community. The Moors are orderly and obedient; they and the Spaniards are the hucksters of the town.

A small detachment of Moors has been sent over by the Emperor of Morocco, for instruction in the military tactics and customs of European nations.

There is an alms-house in the town, on a small scale.

One of the finest colonial libraries in the world is here, the property of the garrison. Access to it by strangers is very easy, an introduction by a member being sufficient to enable one to take advantage of its fine collection of 26,000 volumes and its admirable reading-room. It was founded in 1793, the present commodious stone building having been completed during the reign of George III. The commercial library is also a very fine one.

There are thirty-two public schools in Gibraltar attended by about 3,000 pupils. Five are Protestant, twenty Roman Catholic, two Wesleyan, three to five Hebrew; ten private schools. The number of scholars increases yearly. I cannot forbear mentioning the Gibraltar Infant and Industrial School, where little children, regardless of sect, are not only freely admitted but sought for in the highways and byways, among the families of the poorest classes. The little pupils are here removed from evil influences, given good elementary education, and put on the right path for becoming useful and intelligent members of society. This most commendable institution has been in operation during the last twenty years, and last year seventy-nine little boys and ninety-three little girls received its many advantages. Its expenses are met by voluntary subscriptions.

There are no institutions of art or science in Gibraltar.

*Cette, France.*—There is but one hospital in Cette, that of St. Charles, and it is an institution which would do credit to a much larger place. It is under the partial control of the Sisters of Mercy, who act as nurses, and indeed appear to do the whole work of the establishment. Two physicians compose

the medical staff, and they are, I understand, in excellent professional standing. The capacity of the hospital is 600 beds, but at present only 300 patients are under treatment. The building is comparatively modern, and is quite complete in all its appointments. The wards are lofty, well ventilated by means of numerous windows, and cheerful. An air of order and neatness, combined with cleanliness, is about the whole hospital. No difficulty obtains in introducing a foreign seaman here. He is admitted on an order from the consul, and the charge per diem is 1 franc 50 centimes.

The sanitary condition of the town appears to be pretty good; the natural drainage should keep the town clean. There is no unhealthy season recognized as such. No contagious or infectious diseases exist at present.

The general character of the French is too well understood to require any further statement on my part. In this port they are industrious and well behaved, very many being engaged in fishing.

*Toulon, France.*—There are in Toulon proper two hospitals, l'Hôpital de la Marine and Hospices Civils de Toulon. On the other side of the bay is the Hospital St. Mandrier.

*L'Hôpital de la Marine.*—This building was not erected in view of the service to which it is now given up. It was originally designed as a seminary for the chaplains of the French navy, and was under the control of the Jesuits. This order furnished for sixty years the chaplains for the French navy. After the suppression of this order, the building served as barracks for the marine guards, subsistence-stores, and as a church. About 1841, a general reconstruction of the whole building was commenced to adapt it to the purposes of a hospital; new wings were built, a large kitchen was added, a court-yard for the use of the sick, and many other dependencies. In spite of these additions I am told that the hospital is hardly sufficient. It

contains seven wards, large and well ventilated, besides quite a number of private rooms, elegantly furnished, for sick officers. There are accommodations for about 400 sick. The hospital is placed under the direction of a commissary of marine in what concerns its administration and police; the medical control being vested in a director, a naval officer, having under him medical officers in chief and pharmacists, professors engaged in giving courses of lectures in naval medicine, as well as surgeons and principal pharmacists, surgeons and pharmacists of the first and second classes, and finally, medical aids, all of the French naval service. The principal pharmacy serves as a general store-house for supplying the fleet, with a subsidiary pharmacy for the use of the hospital. The hospital possesses a very excellent museum of physics, a museum of anatomy, and a cabinet of natural history, of geology and botany, besides a good medical library. There is a complete system of baths of all kinds, Turkish, Russian, sulphur, etc., really a well-appointed hydropathic establishment. The naval school in the hospital prepares young men for passing into the French naval service. There are several large lecture-rooms and an admirable dissecting-room, well supplied with material. There is everything to commend about this hospital; all the appointments are perfect, and nothing is apparently wanting which might add to the comfort or tend to the speedy cure of those placed in its wards. In the surgical wards especially one is impressed with the neat and scientific manner in which the various injuries are treated. To this hospital are sent any sick of our Navy or merchant service from vessels in the harbor, and I am quite sure, from my personal observation, that they would be well cared for. There is no difficulty in having them admitted, the fact of their being sick, with a statement of the probable malady from which they are suffering, communicated through the American consul, being sufficient. The charge is one franc a day, including everything.

*Hospices Civils de Toulon, viz, l'Hôpital St. Esprit, ou l'Hôtel-Dieu, and l'Hospice de la Charité.*—These two institutions adjoin each other, and are under the administration of a commission of five members, the mayor of the city being its president. The former, of this double institution, receives the general sick of Toulon and the commune, acute and chronic cases, injuries, sick prisoners, cutaneous diseases, venereal diseases of both sexes, pregnant women. The latter, old poor people, indigent incurables of both sexes, poor orphans, children in need of succor, weaned or at the breast, and wet-nurses for their accommodation; old men, under the title of "pensioners," idiots of both sexes, sick strangers. The number of beds in the hospital is fixed at 380; in the Charité, 392. Most of the nursing is done by the Sisters of Charity. Two physicians and three surgeons comprise the medical staff, all in good professional standing. The position of this institution is very attractive, removed as it is from the heart of the city, and having in front and under its control a large garden. Certainly a hospital so valuable to the community should be in a better condition than I found it. The fault is not so much in the construction of the buildings as in the way they are looked after. A general untidiness pervades the place. Heaps of rubbish are allowed to accumulate in the court-yards, and the drainage is neglected. The ventilation is poor, and various disagreeable odors greet you at every step. The wards themselves are quite large, with numerous windows, but the air in them was bad; the beds were not as clean as they might be, and were hard and uncomfortable.

*L'Hôpital de Saint Mandrier.*—This is one of the largest naval hospitals of France. It takes its name from the peninsula on which it is built, on the side of the bay opposite Toulon. Many years ago a priory occupied this spot, which, after being abandoned, was used as a hospital during the wars of the Spanish

succession. After the evacuation of the Spaniards the priory was kept as a hospital for sailors and galley-slaves. About 1830 the present hospital of Saint Mandrier was finished. It is the principal hospital of reception for the sick soldiers coming from the French colonies in Cochin China, etc., arriving here direct in the transports. There are a main building and two lateral pavilions, each one standing separate, forming three sides of a square, in the centre of which is the court-yard. The main building and pavilions have three floors, with arched galleries on each floor, where the patients can exercise in inclement weather. There is a total of 716 beds, though over 1,000 sick could be received if the necessity existed. In the central pavilion are placed, on the ground-floor, the kitchens, baths (most complete), the pharmacy, the linen-room, and the amphitheatre. On the first and second floors, the chambers of sick officers, those of the attending surgeons, the apartments of the Sisters, the officers of the hospital, and a small chapel elegantly furnished. Although designed more especially for the reception of the sick from the navy, the Hospital of Saint Mandrier rendered great service to the army in receiving the sick and wounded of the Roman expedition in 1849, and those of the Crimea and of Italy in 1855 and 1859. During the two latter wars the number of wounded was so considerable that it was necessary to put up fourteen wooden barracks, and at that time more than 1,400 sick were provided for. The scenery about the hospital is very picturesque; its location is well chosen. The grounds of the establishment are very fine. There is an immense botanical garden, containing very valuable exotics, two large hot-houses, etc. The mountain itself, which overlooks Saint Mandrier, has been converted into a garden, and on its sides flourish strawberry trees, pines, juniper trees, lilies, and the beautiful Spanish furze. It is towards the summit of this garden where you find the two cisterns which fur-



nish the water for the hospital. The largest one, circular in form, is divided into two vaults, communicating the one with the other by a series of openings, acting as filters for the water; capacity, 3,500 cubic metres. With other smaller cisterns, the total capacity is 6,000 cubic metres. There were very few patients in the hospital at the time of my visit. Everything was in perfect order, the wards were clean and neat, the ventilation good.

On the same peninsula as Saint Mandrier, and but a short distance away, is the lazaretto of the port of Toulon and the quarantine station of the port.

The sanitary condition of the town and port of Toulon was good. No epidemic or infectious disease existed. There are no diseases peculiar to the place, no unhealthy season recognized.

The character of the French people is well known. Here they are peaceful, pleasure-loving, bright enough, and generally industrious. The lower classes find employment in the government works, and are engaged in fishing and farming. They are generally of low stature.

There are no institutions of art or science, worthy of special mention. Educational advantages are good, and the poor are well cared for.

*Nice, France.*—There are in Nice four hospitals: Civil Hospital of St. Roch; Military Hospital, an annex of the preceding; l'Hôpital St. Croix; and Asile Évangélique, the Protestant hospital.

The Hospital St. Roch is quite an extensive institution, having a capacity of between four and five hundred beds. It is in the form of a quadrangle, having a fine court-yard in the centre, planted with trees and flowers. The wards are clean and well ventilated, the beds neat and comfortable. Its position at the head of a square is attractive, and gives it a free circulation of air. Admission to natives and destitute foreign-

ers, free. I understand no difficulty exists in sending any sick men from our Navy or merchant service there. The charge is about 3 francs a day. The medical staff are in good professional standing. I was unable to obtain any details of the administration of this institution, and can merely give the result of my personal observation.

The Military Hospital is a small affair, occupying a portion of the main building of St. Roch and a wing of two stories built out from it. There are two large wards for the private soldiers, and a number of rooms, containing each from two to three beds, for sub-officers and commissioned officers. Capacity, 107 beds. The lower ward, for the wounded, etc., was well ventilated; the upper, for fever cases and ordinary diseases, badly ventilated. The hospital is of course under the control of the government.

L'Hôpital St. Croix is only mentioned to be condemned. It is in a filthy condition, besides being old and dilapidated. Indiscreet invalids can hire rooms here for 5 to 10 francs a day, everything included, or they can occupy the dirty wards at a much lower rate. Capacity, 50 beds.

The Protestant Hospital is a small establishment, sustained by voluntary subscription and the proceeds from fairs and entertainments in its behalf. It is well managed, neat, and clean.

The quarantine station of the port is at Villefranche, where vessels are boarded by the quarantine officials. Clean bills of health entitle to immediate pratique. The general quarantine laws of France are in force; no special rules existing, as far as I can ascertain.

Sanitary condition of the town and port good. No prevailing diseases and no unhealthy season. Nice is well known as a refuge for those suffering from an infinite variety of maladies, especially those of the chest, on account of its equable climate, its mild and genial winter season.

Nice touches Italy so closely that its inhabitants partake to a considerable extent of the Italian character. They are rather quick to take offense, sometimes quarrelsome, rarely passionate. They have more wit than learning, and are not inclined to hard physical labor. They are rather below the average height.

Besides the large government manufactory of cigars and tobacco, there are no industrial establishments of note in this town.

Educational advantages are excellent. The Lycée National is to be rated as the largest educational institution. It is attended by between four and five hundred scholars, some boarders and others externs. It is managed like the other government lycéums through France. Then there are the different parish schools, under the control of the church.

About an hour's drive from the town is found the Asile des Aliénés, a large asylum for the insane, directed by the Sisters and Brothers of the Assumption. It was unfortunately burned not long ago, but is now almost entirely rebuilt. Any one is admitted by paying. The insane poor of the department are taken at a low rate, the department paying the expenses.

Hospice de la Charité and Petites Sœurs des Pauvres are the two principal charitable establishments of Nice. In the former, a large institution, destitute orphans of both sexes are admitted and kept until they have learned a trade and situations have been found for them; only for natives. In the latter, old people, poor and infirm, are cared for.

*Savona, Italy.*—There is only one hospital in this port, that of San Paolo, under the care of the Sisters of Mercy, with a medical staff of seven physicians and surgeons. It is a creditable establishment, and quite equal to the usual demands made upon it; at present it is not half full. Its nominal capacity is 250 sick of both sexes; but double that number have been and can be readily provided for in time of necessity. One of its wings is devoted to male patients, the other to females.

There are pleasant corridors open to the south, and well-kept court-yards filled with lemon and orange trees, where the convalescents can take exercise. The wards are very spacious, well lighted and ventilated, and scrupulously clean; strange to say, no smells exist. The beds and bed-linen are clean and well attended to. No means are provided for heating the wards beyond open vessels containing live coals, quite insufficient for the purpose. This is a great drawback, for even in this mild climate there are days when fires would not only be most welcome, but very desirable for the sick. As is the case in almost all hospitals in Italy and Spain, on the seaboard, no separate wards are found where contagious or infectious cases would be treated; they would doubtless be indiscriminately introduced into the general wards. To natives, inhabitants of the prefecture, the hospital is free, but strangers, sailors of any nationality, sojourners, are admitted without any difficulty by paying about a franc and a half a day.

The following are some of the facts regarding quarantine regulations of the port: Vessels are not boarded on entering the harbor, by the sanitary officials, the captain being obliged to repair to the health-office with his bill of health and log-book of the cruise to obtain *pratique*. The charge for a bill of health is five francs. Should there be any mild cases of contagious disease on board a vessel she would be sent to Vardo Bay, a short distance from this port, a sanitary officer placed on board as a guard, and medical visits paid as may be considered necessary; the charge per day for sanitary guard is from three to four francs, medical visits two francs each. Should a vessel be in a very bad condition as regards the health of her crew or passengers, a contagious or infectious disease raging, she would be at once dispatched to Spezia, where a lazaretto is located.

I am informed on apparently good authority that all ves-

sels arriving from New Orleans, La., even when having clean bills of health, and independent of season, are subjected to a quarantine, just outside the port, of three days' observation.

*Constantinople, Turkey.*—There are in Constantinople six foreign hospitals: the Austrian, German, English, French, Italian, and Russian; and two native, the Greek and the Armenian. The Turkish Government has about ten hospitals, among which that of Haidar Pasha, in Scutari, Turkey in Asia, for soldiers, is the largest. The municipal hospital in Pera is under the charge of Sisters of Charity, Catholic nuns, and is supported by the municipality and by donations.

*German Hospital.*—The Prussian Government has just erected this really admirable hospital, the one formerly used having been destroyed by fire. It has only been occupied since the first of the year, and some of the interior portions of it are not as yet quite completed. Its situation is commanding, overlooking Galata and enjoying a magnificent view of the Bosphorus. It is substantially built of brick and stone, three stories in height, excellently well drained, and with an extensive and pretty garden surrounding it. Within, it is to a great extent fire-proof; the corridors are laid with stone, the staircases of stone and iron. I noticed the modern invention of electric bells throughout the building, and on all the floors there is a plentiful supply of water. Ventilation everywhere is good; there are, besides the numerous large windows, air-shafts in many places. Heating is by means of porcelain stoves. Instead of having one or two large wards, as is usually the case in hospitals of this size, there are six good-sized rooms, square, two on each floor, containing in all about thirty beds. They are all well ventilated, bright, sunny, and clean. All the appointments in the way of beds, bedding, furniture, etc., are modern, and of excellent description and quality. Besides these six large square rooms or wards, there

are three smaller ones with four beds in each, and then forty private rooms containing single beds. There are bath-rooms and water-closets on each floor, well arranged. The pharmacy is a model of neatness.

Although the government erects and furnishes the building, its running expenses, as I understand, must be met by receipts from the patients who pay for their accommodation. Men, women, and children are admitted, not only Germans but those of any creed or nationality, who are sick and able to pay for their treatment. Indigent Germans are received gratis, but those who can pay are charged according to their privileges. In the common wards Germans pay eleven piastres, others fifteen piastres a day; in the private rooms some twenty piastres, others thirty piastres a day. Eighty patients of both sexes can be comfortably cared for, but in time of necessity double that number could be received. The hospital staff is composed of two physicians; its domestic management is in the hands of Sisters of Charity. Sick American sailors would be admitted here without any difficulty by paying the usual charges.

*Italian Hospital.*—This hospital is also a new one, having only been occupied within the last six months; it is both an elegant and imposing structure. It has spacious grounds, which are just now much torn up and in a great state of disorder. It is built of stone and marble, three stories in height, very lofty, making the ceilings between each floor quite high; fire-proof, as far as marble corridors and staircases can make it so. All the modern appliances and conveniences are to be found. The ventilation is excellent throughout, the latrines clean, with plenty of water at command. The site of the hospital is a very fine one. There are three large wards, only two of which are at present in use; the rest of the building is cut up into private rooms, with one rather large ward for women.

Women and men are admitted, not confined to Italians; sick persons of any nationality are taken in by paying. Poor Italians pay nothing; those who can pay are charged according to their lodgment. In the common wards Italians pay two francs, others three francs a day. In private rooms the former pay from five to six francs, the latter eight francs a day. These private rooms, though cheerful enough and well ventilated, are not very well furnished; many are uncarpeted; want of money the reason given.

The Italian Government defrays the greater part of the expenses of this institution, the revenue derived from the patients being insufficient. There are at present about thirty patients under treatment, but there is accommodation for one hundred and fifty, and two hundred could be taken in in case of need. There are two physicians in attendance, one of whom lives in the hospital. Sick American sailors would be gladly received here by paying the fees mentioned above, and I am satisfied that both in this and in the German Hospital they would receive every attention. Sisters of Charity have general charge.

*Turkish Municipal Hospital.*—This hospital gains nothing by comparison with the two just mentioned; indeed, its deficiencies are thereby made all the more manifest and glaring. The sister superior of the Sisters who are in charge here rather hesitated about showing me the premises, and acknowledged frankly what a miserable building it is, a disgrace to the city. In fact, it is nothing but an old wooden barrack, ready to fall to pieces, well ventilated through the many cracks and crevices in its sides. The floors shake as you walk over them, and the ceilings overhead are in holes. It barely escaped destruction by fire not long since, the flames being, fortunately for the patients, limited to one of the upper rooms. Its location is most undesirable, in one of the dirtiest and most cramped-up streets of Galata. The best that can be said of it is that the wards are kept clean, considering their crowded condition. The hospital

is altogether too small to meet the daily demands upon it. It only contains about sixty beds; numbers are turned away daily, and those at present under treatment are dangerously crowded. It is a free hospital for the poor, the municipality defraying the expenses, but with no liberal hand. There are two Greek physicians in attendance.

*British Seaman's Hospital.*—This is doubtless the best-managed hospital in Constantinople, because there is no lack of funds for its proper maintenance. It is supported by liberal donations from the English Government, and also by hospital tonnage fees exacted from every English ship entering the Golden Horn. Its location is not a very good one, and it is not an extensive establishment, but quite large enough for the demands upon it. Inside and out everything is in admirable order, and it wants for nothing which could add to the comfort of the patients it encloses. It has existed for many years, is a substantial stone building, well ventilated, well drained, clean throughout, and in good repair. Three large wards, opening into each other, contain thirty beds; one of these is used exclusively for syphilitic cases. There is another detached ward for contagious diseases. The total capacity of the hospital is seventy beds. Although this hospital is especially designed for British seamen, those of other nations would be admitted on payment of the daily charges, which amount to three or four shillings. I should consider this the best place to send sick American sailors. They would be well looked after and very comfortable. No difficulty exists in having them admitted, a guarantee from our consul that their expenses will be met being sufficient. There are two physicians, one of whom is an interne.

A word about the Greek philanthropic institutions will not be uninteresting. They are four in number, situated in the western part of the city, near the Seven Towers. They are the Hospital, the Asylum for Orphan Boys, the House of Correction, and the Asylum for the Poor, or the Infirmary. These



institutions are under the supervision of a committee of seven well-known Greeks, which committee is assisted in its work by another of five ladies of the richest Greek families. Together they form a board of inspection, there being, besides, a general director of the institutions. They are supported by the donations of the Greek communities and of private individuals, as well as from the income derived from different properties, houses, gardens, etc., belonging to them. The annual expenses of these institutions amount to about one million Turkish gold piastres (\$47,300), while the income is estimated at about \$45,000. This deficit, varying of course, is always met by the subscriptions of the rich Greek merchants and bankers. The Greek Hospital has a capacity of 170 to 180 men, and 20 to 30 women; the Infirmary 40 to 50 men, 10 to 20 women; the House of Correction 140 to 150 men, 60 to 70 women, and the Orphans' Asylum 110 to 120 boys; so here we have from 550 to 620 persons provided for yearly in these institutions. Everybody is admitted into the hospital free of charge. The building is quite a large one, comparatively new, fairly clean, and well ventilated. It has a good site, and handsome grounds about it. I copy from the report of this hospital for 1874, a statement of 3,065 patients who were treated during that year. How many different peoples are represented!

Constantinopolitans .....	282
Levantine .....	527
Thracians .....	329
Bulgarians .....	442
Macedonians .....	227
Thessalians .....	134
Hesperotes and Albanians .....	477
Islanders .....	255
Greeks (Greece proper) .....	306
Wallachians .....	16
Austrians .....	4
Russians .....	3

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 3,065

The Greeks, I am told, intend building a new house of correction, after the latest improvements, and also of improving the Orphans' Asylum.

*Quarantine, etc.*—All ships, no matter of what nationality they may be, must pay a sanitary tax upon their arrival in the first Ottoman port, if they come from foreign ports; the same rule holds for ships going from one Ottoman port to another. But ships destined for Constantinople, and those going through the straits to the Black Sea, or *vice versa* for the Mediterranean, pay the tax at Constantinople, at the office in Galata, if they come from the Mediterranean, at the office in Kavac, in Asia, or at Buyukdereh, if they come from the Black Sea. The tax is as follows: From 100 to 500 tons, inclusive, 20 paras per ton; from 501 to 1,000 tons, 12 paras; from 1,001 tons and above, 8 paras a ton. Men-of-war are of course exempt from the above tax, as well as ships which have been obliged by stress of weather to put into an Ottoman port, provided they transact no business while they remain there.

All vessels *en route* to Constantinople, stop at Chanak to have their bills of health examined if they come from the Mediterranean; at Kavac, if they come from the Black Sea. Should the bill of health be found all right, they proceed to their destination. But at Constantinople the bill of health must again be shown at the health-office in Galata before pratique will be granted. Vessels arriving from any port in the Black Sea where there exists any contagious disease, must stop at the sanitary office at the entrance of the Bosphorus, where the ship will be kept under observation for ten days. Should any persons on board be ill with any contagious disease, they would be sent ashore and lodged at the lazaret at Kavac. There all persons over seven years of age pay 5 paras a day; the very poor pay nothing. Should the ship have to be disinfected, the charge would be, for vessels of 100 tons, 10 paras; 200, 20

paras; 400, 30 paras; 1,000 and above, 40 paras, for each day of disinfection. These same rules hold good for infected or suspected vessels coming from the Mediterranean, the quarantine station for them being at the Dardanelles. The charge for health guards on ships, a day, is 25 paras. Ships are not boarded by sanitary officers on entering Ottoman ports. The bill of health must be sent to the health-office.

The sanitary condition of Constantinople is most unfavorable to health. Hardly any effort is made to clean the streets, which are in a shockingly filthy condition. Really the only scavengers the city has, are its famous dogs. The public latrines which are found in some of the streets are horribly offensive. The citizens make free use of all the streets besides. In some places the stench is dreadful, and one wonders that any degree of health can be maintained while breathing such foul air. I tried to get some statistics of the death-rate, but could not succeed. I doubt if it would be possible to calculate it. Still the general health of the city was tolerably good. Fevers of a low type, typhus and typhoid, were somewhat prevalent. Small-pox can always be found, cases here and there constantly occurring, but there was no epidemic of any kind.

I was agreeably surprised that no cases of syphilitic disease occurred among our men. I was led to believe that there was great danger of their being infected ashore. Only two cases of gonorrhœa have been treated.

No season is recognized as being particularly unhealthy in Constantinople. There are no special recommendations as to precautions necessary to prevent diseases or their spread on board of vessels visiting the port.

*Educational institutions.*—The best schools of Constantinople are those of the Christians. The Turks have public schools which really amount to nothing. After these come the secondary or middle schools, where they teach the Arabic lan-

guage, history, and elements of geography. But the superior education of the Turks is received in the Medresses, or colleges; there they study grammar, logic, literature, etc. The students of these colleges are divided into three classes, the Softas, the Mends, and the Danischmends. Those of this latter class who do not wish to finish their studies by taking up dogmatic theology and law, become Kadis, Muftis, and Imans. The real Ulemas, or accomplished students, are very few. Besides the public schools and colleges other special schools exist, the Imperial School of Medicine, which educates young men for the naval and military service, established in 1830, the Naval School, etc.

The Christian schools are those of the Greeks and the Armenians. The most important educational institutions of the Greeks in the capital are the National College of Phanar, 500 students, 12 professors; the Commercial College of Khalki, 260 students, 12 professors; the Theological College at Khalki, 80 students; the Greek Lyceum of Pera, 20 professors. Then there are a special lyceum and some private institutions. The primary superior schools are 36 in number, having 1,000 students. The primary schools, properly so called, educate 5,000 boys; of them there are 50. The colleges for females become yearly more numerous. Two years ago two very important ones were founded, the Pallas and Zappion; these have more than 400 pupils. Besides these colleges, the Greek community of Constantinople possesses 15 more public schools, having about 2,000 pupils. The Greeks have also 20 sullagus or clubs, scientific institutions, in the capital. In a word, the Greeks have 105 educational institutions in Constantinople, where 12,000 students are educated, 300 being females. The number of teachers, professors, and governesses is 260. I am informed that the Greek community spends for the maintenance of these institutions 4,000,000 piastres yearly, but this seems incredible.

*Genoa, Italy.*—The Ospedale Pamatone, or civil hospital, is the largest hospital in the city. Its location is very bad, situated as it is in one of the most closely-built sections, the houses encroaching on it on all sides, shutting it out from access of fresh air and sunlight. Its drainage is also very defective from natural causes, as it has a height of only six or eight feet above the sea-level. The building is very old, indeed, and in its appointments it is not up to the standard of the day. The general arrangement of the wards is not bad, but their ventilation is very poor. The number of cubic feet of air allowed each patient, I am quite sure, would fall far short of that generally recognized as necessary. The system of latrines and water-closets is open to serious objection; the doors lead directly into the wards between the beds; they are unclean, and the odor from them is quite appreciable. I understand that the board of directors scout at any system of disinfection. The use of carbolic acid or sulphate of iron is unknown. The wards are very large, long, and wide, with arched ceilings; walls perforated with many windows; through these and a few openings in the walls near the ceiling the ventilation of the building is carried on. No adequate means exist for heating the wards, and at the time of my visit, the weather being cold, the patients looked chilly and uncomfortable.

The capacity of the hospital is placed at 1,200. No provision is made for the isolation of contagious or infectious diseases. I am told that it is no unusual thing to see cases of fracture and variola side by side. The hospital is free to all sick poor of Genoa. The medical staff consists of forty surgeons and physicians. I saw nothing to admire, but much to condemn in this hospital. I am informed that nearly thirty per cent. of all cases operated upon do badly, carried off by erysipelas or pyæmia.

The Military Hospital has a commanding situation, on a hill overlooking the city and bay. It was an old monastery, which has been adapted as well as possible to its present use; it is far from being suited to the purposes of a hospital. It is a great rambling stone barrack, with narrow corridors, through which sweep cold draughts of air. The whole building is cold and cheerless, the wards, though quite large as a rule, bare and poorly ventilated. They are, however, kept quite clean, and the beds and bedding would pass inspection. The sick are apparently well taken care of, the nursing being done by the Sisters of Mercy and soldiers from the ambulance corps of the Italian army. Medical and surgical appliances are of the rudest order; a general condition of disorder prevailed throughout. The medical officer with whom I was in company was loud in his denunciation of the condition, hygienic and otherwise, of the establishment, and expressed the opinion that it was a disgrace to the government. Its capacity is from 250 to 300 patients; at present it contains about 210, a large proportion being cases of measles; the others were principally pulmonic complaints, with here and there a case of typhoid. The culinary arrangements were shocking, the smoke filling the kitchen, bringing tears into one's eyes. How anything tempting to the palate of a sick man could come from such a place is beyond my comprehension. With the expenditure of abundant funds this hospital could be made a magnificent one, as its site is one of the finest about Genoa.

Last, but not least, to be mentioned is the little Protestant Hospital, of which I can speak in terms of high commendation. With little to support it, it is, in my opinion, the best hospital in Genoa. It occupies a large house, formerly a residence, on high ground, in the city. Necessarily its arrangements are far from being perfect, but improvements are steadily being made as money comes in. It is supported by collections from the various Prot-

estant churches in Genoa, from voluntary contributions, and proceeds from bazaars and fairs held for its benefit. It has been in existence about eighteen years, but not in the same place; the present building is a recent acquisition. Suites of rooms have been turned into wards; and although no plan of ventilation is in force, the cleanliness which is observed, with the sensible regulation of windows and doors, keeps the air in the wards and throughout the building pure and good. Separate wards are found where syphilitic and contagious diseases are treated, and there are two or three well-furnished, bright rooms for those who can afford to pay for private accommodations. Capacity limited to 31 patients of both sexes. For the Protestant poor the hospital is free, the sick person being sent with a ticket signed by the pastor of the parish to which he or she may belong. Those who are able to pay are charged three francs a day. Sailors from our naval or merchant service would be admitted here without any difficulty at the above charge. I am sure they would receive every attention. There are two physicians in good standing connected with the hospital.

*Quarantine regulations, etc.*—The quarantine station for the port of Genoa is at Spezia. Vessels are at once sent there should any contagious or infectious diseases be found on board or their existence suspected. It is only lately that the law which required *all* vessels coming from the southern ports of North America to be quarantined five days was repealed. Vessels coming from notoriously healthy localities and provided with clean bills of health, are admitted to pratique as soon as the captain has made the examination. Vessels from European and Asiatic Turkey, Egypt, Syria, the islands of the Ottoman Empire, from America, the occidental coast of Africa, from the countries off Cape Horn, and the Suez Canal, must undergo the medical visit performed by the physician of the health-office. He comes on board, the crew is mustered on deck,

the captain is examined as to any sickness which may have occurred during the voyage, the bill of health is surrendered, and if all are well, and the hygienic condition of the vessel is satisfactory, immediate pratique is granted. Such is the law, but I imagine, except in cases of vessels coming from America, it is more honored in the breach than in the observance.

*Stay in the lazar-houses.*—Persons landed at the lazar-houses, for whatever reason it may be, pay for each day of residence there a sojourning fee according to the class to which they may wish to belong, as follows :

	Lire It.
For the first class .....	3
For the second class .....	2
For the third class .....	1

A visit of the health-officer to any ship has a fixed fee of lire It., 2. A bill of health costs lire It., 3.

*Maritime sanitary fees.*—All vessels, national or foreign, sailing or steaming, coming from European or Asiatic Turkey, Egypt, Syria, the Imperial Ottoman islands, from America, the occidental coast of Africa (except the possessions of Morocco), from the countries off Cape Horn, and the Suez Canal, are required to pay for each ton of capacity and for each stoppage in the Italian ports, 45 centimes. Sailing-vessels coming from localities not enumerated above must pay for each stoppage 25 centimes per ton ; steamers, 7 centimes. The fees for vessels coming from abroad must be paid at the first port of stoppage in the kingdom.

The sanitary condition of the town and port of Genoa is very satisfactory ; no diseases were prevailing in an epidemic form. The city is well drained, there being an abundance of water, the sewers are frequently flushed and the filth in them swept into the sea. The streets are in good repair, and are fairly



clean. As to prevailing diseases, scarlet fever, small-pox, and measles are met with during the whole year, but almost always as scattered cases, and in not very violent forms. Vaccination is not compulsory. On our last visit to this port measles were prevailing to a considerable extent, but at present diseases of the air-passages, such as diphtheria, various forms of sore throat, and bronchitis, hold the most prominent places on the health report. These will be replaced later on in the season by troubles of the digestive system, diarrhoeas, dysenteries, etc. Malarial fevers, I am informed on good authority, are almost unknown here; the rocky foundation of Genoa and its suburbs does not favor their development. When met with they are as importations from Rome and elsewhere.

Owing to the strict laws regulating prostitution in Italy, domiciliary visits, etc., Genoa is singularly free for a sea-port town from venereal diseases.

The time of year when this city is considered the most unhealthy is the autumn, then fevers of a typhoid type appear, and the mortality rises somewhat. There is no actual unhealthy season. The average yearly mortality is about 22 per 1,000.

It would be difficult to meet with a more law-abiding, peaceful, and industrious people than the Genoese. It is true that their character has improved very much of late years; from being priest-ridden and superstitious they have become active in business, ambitious, and shrewd in money matters. Examples of drunkenness or rowdyism are very rarely met with, and the standard of morality is by no means low. They are possessed of good mental and bodily vigor.

Genoa is very well supplied with both charitable and educational institutions, but none of them are worthy of any lengthy notice. I will briefly mention them. There is an insane asylum;

an institution for the blind, where the inmates are well instructed and put in the way of making their own living; a deaf and dumb asylum, where a great deal of printing for the city is done; several poor-houses, and an orphan asylum. In the latter institution trades are taught, and situations procured when the inmates reach a proper age. Should the girls contemplate matrimony, they are started in life with a small dowry given from the funds of the asylum. Among the most interesting as well as useful and beneficent charitable institutions of Genoa, for charitable it may truly be called, is the *Monta da Piet *, or government pawn-shop, where, by leaving as security any article, jewelry, clothes, etc., the depositor in need of money can procure it at once and without question, in sums from one franc and a half upwards. At any time the article can be redeemed by paying the sum advanced plus 5 per cent. for the use of it, if under twenty francs, 6 if over; or the article can be left in pawn for six months to a year and even renewed indefinitely if required. In this way the government loans out four million francs yearly. It is an establishment of incalculable advantage to the poor, as it is run as far as possible in their interest, and it keeps them out of the hands of usurers. Annexed to this is a savings-bank, where the smallest sums are received at 3 per cent. interest.

There is a medical school in Genoa not largely patronized, and with no distinguished names on its faculty. Diplomas are conferred after a course of study extending over four years.

*Spezia, Italy.*—There are but two hospitals in Spezia, the Government Naval Hospital and the Civil Hospital. The first is under the control of the admiral commanding the station. Soldiers are admitted here as well as sailors. It is situated back and just outside of the parade-grounds of the arsenal, facing the sea, and exposed to the breezes blowing into the gulf. The building is comparatively a new one, as it has only been occu-

pied within the last two years; indeed, parts of it yet remain unfinished, and the grounds have yet to be arranged. Its cost was 600,000 francs. There is a main building forming a front, and two wings at each end, running out at right angles towards the gulf. These wings form, actually, four separate, substantial, three-storied edifices, communicating through the corridor of the main building, and by a gallery at the end of each two. In this way a free circulation of air is insured. The wings contain three wards, one in each story, making twelve in all. Approximately, the wards measure 100 feet long by 30 wide and 20 high; amount of cubic feet of air-space, 4,000 for each patient. They are apparently well ventilated, both by numerous windows and by openings near the floor and ceiling. The beds, of iron, are clean, with two mattresses on each, which are neat and comfortable. The floors are laid with varnished tiles. Besides the general wards there are private apartments for the use of officers, and other rooms well isolated, where contagious and infectious diseases are treated. In the wards the cases are classified. Means of heating defective; stoves, two in each ward. As they have been found insufficient, they are to be replaced by furnaces in the basement, which will drive hot air through the building and wings. The main building is used for offices, etc. Nursing and cooking are done by Sisters of Charity, whose services, I was told by the surgeon in charge, are invaluable. I was much pleased with the kitchen, from which issued the most savory odors, and where everything was bright, clean, and inviting. The very best of food, and in great variety, was in course of preparation.

I was not surprised to find, even in this new and well-appointed hospital, the worst of water-closet arrangements, because so little attention is paid to this matter in Italy. Here the latrines smelt so vilely in spite of chloride of lime

that the doctor hesitated to let me examine them. Instead of letting the feces and urine flow into the sea through proper drains, the deposits are allowed to accumulate in large cess-pools beneath the building. There are no seats for the patients; when defecating they must assume a squatting position. There are no traps below the bowls, and only occasionally is water sent through the pipes. It is hoped by the officials that this state of things may be remedied very soon. The hospital seems to be well supplied with good instruments; has an excellent pharmacy, fine operating-room, etc. The capacity is about 400, when full. At present there are about 150 under treatment. Sailors from American men-of-war would be admitted through the agency of the United States consular agent, but those from the American merchant service would not be admitted. Charges, from one and a half to three francs. In no particular does this hospital surpass the naval hospitals in the United States.

*Civil Hospital.*—Seventy-three years ago, when this building, then a convent, was converted into a hospital, doubtless it answered well the purposes of a town of 6,000 inhabitants; but now, with a population more than three times as large, it is altogether too small. Its capacity is only 100 beds. Just now it is only half full, but Spezia happens to be in an exceedingly healthful condition. It is an irregularly-shaped building, on the main street of the city. From a central rotunda open three wards, two of comparatively large size, say 80 by 30 feet, the other much smaller. Ventilation in the large wards is by windows near the ceiling. In them the air was tolerably pure, but in the small ward, where there is but a single window at one end, the atmosphere was foul, and there was also a scarcity of light. Besides these wards there are some private rooms poorly furnished. The beds and bedding are old and miserable. Part of the building is for female patients. They are huddled

together in small, uncomfortable, badly-ventilated rooms. Thorough cleanliness is unknown; dirt reigns supreme over this poor hospital. Kitchen was dirty and the quality of the food poor, judging from what I saw being cooked. Patients complain of not having enough to eat. There is no charge for the poor of the city and province. American seamen would be admitted here through consular agency without difficulty, at a charge of one franc fifty centimes in the wards, two to three francs in the private rooms, per day. .

Spezia is subject to the same rules and regulations of quarantine as Genoa, and, as at the latter place, it is necessary to take the bill of health ashore to get pratique. The sanitary office is quite near the landing. The quarantine station of the port is at Varignana, on the east shore of the bay, but two or three miles from the town. This is, as well, the quarantine station for the north coast of Italy as far as Leghorn. The lazaretto on Varignana point is a very extensive one indeed, occupying, with the quarters for passengers, store-houses, etc., many acres of ground. Its position is a cool and delightful one. Accommodations are ample, but not luxurious; 1,200 persons can be received, if necessary. Lodgings are divided into three classes: for the first, three francs a day are paid; for the second, two francs; for the third, one franc. In this, food is not included; this is purchased according to a regulated tariff. Medical visits are gratis.

Sanitary condition of the town and port of Spezia is very good. The streets are kept fairly clean, as a general rule, and the drains in the new part of the town are pretty thorough. There is a system of drains leading into the sea. In the old part of the town cesspools still exist, which have to be emptied from time to time. The health of the town is remarkably good, if we are to believe the statistics, which give a mortality of only eight and a half per thousand. No diseases of a

contagious or of an infectious nature exist, if we except a few cases of measles among the minors. Spezia has some reputation as a sanitarium as well as for excellent sea-bathing. During winter it is visited by invalids suffering from pulmonary diseases, and they are generally benefited by its mild climate.

There is an abundant and pure water-supply. It is introduced by iron pipes three miles long, leading from springs in the hills back of the town. The amount per head is 20 litres.

I cannot discover, on close inquiry, that Spezia is any more subject to visitations of small-pox than other Italian cities. It has existed on several occasions within the last fourteen years, but the people claim that it has always been introduced; at any rate it has never shown any tendency to spread, and cannot be regarded as a prevailing disease. It is denied that there are any prevailing diseases, or that there is any unhealthy season.

The inhabitants of Spezia are quiet, sober, but not overindustrious. There are no institutions of any kind worthy of notice or description.

*Leghorn, Italy.*—There are three hospitals in Leghorn, the Civil, Military, and Jewish.

The first is very badly situated, being in the centre of the city, and altogether too closely hemmed in by buildings for free and proper circulation of air. The city has actually grown up around it, for when it was first erected, hundreds of years ago, it was near the walls of the city. It is exceedingly irregular in its construction, so that it is almost impossible to attempt a description. There is an old and a new part, the former in a somewhat dilapidated condition, the latter well built and nicely arranged. It seems as though wards had been added from time to time, as money became available, without regard to any decided plan. It is supported by the municipality and by bequests; hardly any rich person dies in Leghorn without leaving money to this institution. There are ten wards of large

size, some of them measuring 150 feet long by 40 wide, and correspondingly lofty; others, though large enough, are rather low. There are also quite a number of private apartments. Most of the large wards are in the old part of the hospital, as the new part contains principally large rooms, having from four to six beds. In the wards of the old building, the beds were placed too closely; the ventilation, however, was pretty good, by means of many windows above and openings near the floor between the beds. The wards were quite clean, paved with bricks, varnished, the beds comfortable, and the patients seemed to be well taken care of. The ward where American seamen, when-sent here, are placed, was perhaps the most ill-favored with respect to ventilation in the hospital. But one window at the end admitted air and light, and that opened on a small court-yard, with a drain in the centre, from which I was told came at times bad odors. Otherwise the place is large and kept clean; contains about twenty beds. I thought well of the new part of the hospital; the wards are well lighted, well aired, lofty, and clean, and in them the patients are placed well apart. There are no separate buildings for the treatment of contagious diseases; isolated wards and rooms in the hospital are used for this purpose. A portion of the ground-floor is set apart for the insane. The rooms, or rather the cells, are clean, and ventilation in them good. Apparently no cures are attempted; the patients are simply taken care of. I saw a number with arms strapped together and their bodies tied to the bed.

In the women's part of this hospital the nursing is done by the Sisters of Charity; in the men's, by male attendants. The kitchen is neat and clean; the coppers shone brightly, and the wood-work was as clean as constant scrubbing could make it. Diet seemed palatable and sufficiently varied, maccaroni forming one of the staple articles of food. An ex-patient told me, however, that in respect to quantity there was something more

to be desired. The operating-rooms were admirably lighted and supplied with everything needful, the instruments were modern, including late novelties, and were in excellent condition; the pharmacy large and complete in its appointments.

As usual the latrines were filthy, the stench from them intolerable in spite of the liberal use of carbolic acid and sulphate of iron. No excuse exists for this, with such an abundant supply of water as the hospital possesses, and the general good drainage of the city. Bathing arrangements, too, were very deficient. In an old decaying and damp room were short antiquated bath-tubs, not very clean. The Italians seem to be neglectful in everything which relates to personal cleanliness and comfort in their civil hospitals. The capacity of this hospital is 500; at present it is about half full, owing to the healthfulness of the season. The poor of the city and province are received gratis. American seamen are admitted here through an order from the consul, who holds himself responsible for the payment of the charges. The cost per day, in the ward spoken of, is two francs twelve centimes; in private rooms, from two francs and a half to three francs. The medical and surgical staff is quite large, and chosen from the best physicians in the city.

Of the Military Hospital I have few words to say. The government rents a large building, formerly a hospital for women, from the city. It is an old place, with intricate stairways and narrow galleries, erected on no scientific or common-sense plan. It opens on one of the largest plazas in Leghorn, and therefore obtains plenty of air and light. The two large wards are cruciform in shape; they are about 80 feet long by 30 wide, clean, and well ventilated. On the walls of each ward the number of cubic metres it contained was painted in large letters. Besides these two extensive wards there are some smaller ones, and any quantity of rooms with two, three, or four beds. Isolation of



contagious cases is readily effected. Capacity of hospital, 300; at present there are but ninety under treatment. On inquiry I was told that sick seamen from American men-of-war would not be admitted to this hospital.

The Jewish Hospital is supported by contributions from that sect, for the relief of their own sick. It is a small establishment.

The general quarantine laws of Italy apply to the port of Leghorn; there are no special rules or regulations in force. There is really no actual quarantine station or anchoring-ground for infected or suspected vessels. Should any such arrive at the port, a place apart from other vessels would be apportioned her, a quarantine flag hoisted, and a large "C" displayed on her bows and on either quarter. If any vessel should arrive here reporting that a death had occurred on board during the passage, from some infectious or contagious disease, such vessel would without delay be sent to Varignana, to be quarantined; but if a vessel only comes from a suspected port, she can remain here, undergoing a quarantine of observation of one or two weeks. Should the authorities think proper, her cargo would be discharged in lighters and taken around by water to the lazaretto of the port, to be there kept and properly fumigated, until the vessel is allowed to come out of quarantine. There is a very well conducted lazaretto here near Ardenza, outside the walls, but it is very rarely used. The charge for the accommodation of quarantined persons is the same as at Varignana; as also the charges for storing goods. When a guard is put on board a quarantined vessel the charge for his services is about five francs a day. Vessels entering this port are not boarded by health-officers; it is necessary to take the bill of health ashore to the sanitary office, where verbal pratique is given and the bill of health retained until the vessel is ready to clear.

The sanitary condition of the town and port of Leghorn was

most satisfactory. No diseases of an infectious or contagious nature were prevalent; the health of the town was very good. The streets of Leghorn are very straight and wide, as a general rule, and are intersected by large squares. These are kept quite clean, and through them the city is well ventilated. In fact, the strong draughts through these straight streets predispose residents to rheumatic affections, I am informed; the relaxed condition of the skin in this mild climate, rendering them susceptible. Diseases of the chest and throat would be relieved by residence in this climate, with proper precautions, but as a rule abdominal complaints are decidedly aggravated. The prevailing diseases are rheumatic affections, malarial fever, and diphtheria. There is no established unhealthy season. The town is supplied with very good water from springs in the hills twelve miles away; it is led in by aqueducts. In winter the average temperature of Leghorn is 6° to 8° R. (45½° to 50° Fah.); summer 20° to 25° R. (77° to 88¼° Fah.). In winter the rainfall is moderate for November and February; more during other months. In summer many weeks may pass without a drop of rain.

The Livornese are a quiet, peaceful, and tolerably industrious people, not given to drunkenness or brawls, nor noted for any strict ideas on the subject of morality. There are certain charitable and educational institutions here for the relief and improvement of the poor, and some industrial works exist, but they are hardly worthy of any extended notice or description. There are no institutions of art or science.

*Civita Vecchia, Italy.*—There is but one hospital in Civita Vecchia, the Hospital Bonofratelli. This is situated on a plaza in the centre of the city and faces seaward. It is mainly supported by a charitable brotherhood, the Bono Fratelli, but also receives some little assistance from the municipality. The brothers manage the hospital, acting in the capacities of apothecaries.

cary, stewards, etc., the menial offices being filled by persons employed for the purpose. The total capacity of the institution, including the ward rented by the government for the exclusive use of the military, is 139; not counting the military ward, 109 beds. There are at present but 20 under treatment. The building is but poorly adapted to the purposes of a hospital, and it is besides deficient in nearly all the modern appliances for the comfort and well-being of the sick. The beds are hard and uncomfortable; there are no wafer-closets, and no place for convalescents to exercise outside the wards. There is one large general ward, 125 feet long by 20 feet wide, approximately, and sufficiently lofty, containing 50 beds. It is fairly clean and tolerably well ventilated by numerous windows and openings near the floor. There are, again, two small wards on this same story badly lighted and ventilated. There were no sick in them. Another small ward on an upper floor is occupied by old men as a sort of infirmary. As there are no latrines, ordinary close stools are in use, one between each bed, for the daily and nightly use of the hospital inmates. I was informed that the contents of the vessels were emptied but once a day, at 4 a. m. The air must necessarily be contaminated by the odors from them, and cannot fail to be prejudicial to the health of the patients. For the very poor who are sent to this hospital the city pays one franc a day to the brotherhood; all others who are able to pay are charged one franc and a half per day, which includes everything. Any sick from our naval or merchant service would readily be admitted here through our consular agent, at the charge of one franc fifty centimes a day. There are no private rooms, and but very inefficient means for the isolation of cases of contagious diseases exist. The medical staff consists of one surgeon and one physician, both in good professional standing.

The general quarantine laws of Italy are in force here. There

are no special provisions relating to this port; there is no regular quarantine station or anchoring-ground. The health-officer, when necessary, designates a place; but vessels arriving here with any contagious disease on board are at once dispatched to Spezia.

There is no lazaretto here now. Some buildings on the left of the harbor were formerly used for this purpose, and were under the care of the Capuchins, but they are now abandoned. Vessels entering the port are not boarded by sanitary officers; the bill of health must be taken to the health-office, where pratique is verbally given and the bill of health left until the vessel sails, when it is returned on demand, properly signed.

The sanitary condition of the port is satisfactory; the streets are clean and well paved. No diseases of a contagious or infectious nature exist. The prevailing diseases are fevers of malarial type, but which I am informed do not originate in the town itself, but in the Campagna, which is notoriously unhealthy. This may be partly true. There is no actual unhealthy season, but during the rainy season, in October and November, the sick-rate is a little higher than the remainder of the year.

There is a deficient water-supply in Civita Vecchia, long complained of and easily remedied, but as yet not attended to. The source is from springs in the hills, twelve kilometres from the town, and is led in through the old Roman aqueducts, now in bad repair and clogged up with stones and roots. The water is thus wasted and somewhat contaminated.

A strong effort is being made to bring Civita Vecchia into note as a watering-place. Already strangers resort here during the summer months for the excellent sea-bathing, and for their accommodation two good bathing establishments are open near the town. The warm baths of Trajan, buried in the Roman ruins about two and a half miles from Civita Vecchia, have long enjoyed considerable reputation for their curative powers,

especially in chronic rheumatic complaints, arthritic affections, and in tertiary syphilis. The temperature of the water is about 44° R. (131° Fah.), and an analysis shows it to contain lime and soda muriate, magnesia and soda sulphate, lime carbonate and sulphate, iron silicate, and an undetermined amount of some form of arsenic. Unfortunately the Campagna, in which these baths are located, is too unhealthy for their restoration on the present site. Only rude thatched huts with coarse straw mattresses are there now for the use of persons using the water. A company, however, has been formed and funds raised to conduct the water through glass tubes into Civita Vecchia, where the baths can then be taken in a proper establishment.

The inhabitants are civil, peaceful, sober, strong, and lazy; they are mostly engaged in fishing. There are no charitable or educational institutions worthy of remark, and none of art or science. Under the auspices of a French company some extensive works for the manufacture of alum have very recently been put into operation near the town. Almost inexhaustible quantities of aluminous schist are obtainable within easy distance of Civita Vecchia.

*Cagliari, Sardinia.*—Cagliari possesses a very creditable hospital, the Civil Hospital. It is situated somewhat on the edge of the town, on its western side, on rising ground. It is quite a large building, capable of containing comfortably about 200 sick, exclusive of the syphilitic and insane departments. It is comparatively new, and, indeed, portions of it are yet unfinished. When completed over 300 sick can be cared for. At present there are about 112 under treatment. It is singularly built. There is a long main building with lateral wings, while behind this main building is a semicircular one touching the former at each end, but separated from it in the middle by a handsome garden. From this semicircular building radiate several wards; there are also wards in the main building and wings. It is

somewhat difficult to explain the plan; it is quite novel. The wards are long but not wide, having windows on one side; they contain but a single row of beds. The other wall of the wards is along the corridors passing between each one. This wall is pierced with doors between each bed, not usually open. The dejections of the sick are removed through small openings. This is a good plan as it avoids carrying the excreta through the wards. Again, this wall contains other small openings through which the food is introduced from the corridors. When any one dies the doors before mentioned may be opened and the body quietly removed. Ventilation is very good, both by the numerous large windows, and by large ventilators in the ceiling, some five or six for each ward.

Separate wards exist for the treatment of contagious diseases. Medical, surgical, obstetrical cases are all in exclusive divisions. There are many dry, cool corridors in which convalescents may exercise. The floors throughout are paved with broad brick tiles, and a very fair condition of cleanliness exists. Besides the general wards there are a number of private rooms, nicely furnished, bright, and clean. The nursing is done entirely by Sisters of Charity, and the sick seemed well cared for. The medical staff comprises four of the best physicians and surgeons in the town. Students of the university act as internes and dressers.

The hospital appears to be well supplied with all the modern appliances for the comfort of the sick. Its expenses are met by bequests, money coming from property owned by the institution, money equivalent to the sale of 184 hectolitres of wheat yearly from the municipality, besides which the minister of the interior pays from the public purse the expenses of the syphilitic division of the hospital, and the province those of the insane department. It is governed by a board of directors. The sick poor of Cagliari are received gratis; those who are able, pay one franc twenty-five centimes, two francs fifty centimes, and three

francs, according to certain accommodations. Sick seamen from our naval or merchant service are admitted without hesitation through our consular agent, by paying three francs a day. Should private rooms be desired they can be obtained at five francs a day, everything included. It is the experience of the American consular agent here that foreign sailors receive excellent attention at this hospital.

There is also a military hospital in Cagliari.

The general quarantine laws and regulations of Italy are in force here. No special rules are applicable to this port. At Mount Elias, two miles from the city, on a point of land, is located the lazaretto. It is admirably situated, and is quite extensive, quite out of proportion to the demands of a place of this size. It is arranged very much as at Varignana, only on a smaller scale. There are two large court-yards, around one of which are found the apartments for the accommodation of first and second class inmates; about the other, places for those of the third class. These pay, respectively, one, two, and three lire a day. Large store-houses are also found for storing goods from infected vessels. Six hundred persons can be received here at one time. It is now four years since this establishment was in use, and it is beginning to look somewhat dilapidated. A medical director lives here during the whole year. Vessels put into quarantine would lie about midway between Cagliari and the lazaretto, apart from others. Vessels entering the port of Cagliari are not boarded by health-officers; it is necessary to send the bill of health ashore to get pratique; merchant captains must also present their log-books at the health-office for inspection.

The sanitary condition of the town and port is quite satisfactory. The streets are clean, and I am given to understand that the drainage is excellent. It might well be so, especially from the upper town, built, as it is, on the side of a steep hill.

I noticed a most offensive smell arising from the western part of the town when the wind blows from that direction; caused by unfilled marshes, into which the offal, blood, etc., of a slaughter-house flow and putrefy. It is in prospect soon to abate this nuisance.

The prevailing diseases of Cagliari are those of a rheumatic, pulmonary, and malarial nature. An inflamed or weak condition of the eyes is not uncommon, arising from the intense glare of the sun upon the tufa formation in and about the town. Autumn is spoken of as the most unhealthy season of the year. Then malarial diseases, intermittents and remittents, prevail to some extent, and the abrupt changes of temperature predispose to joint affections and chest diseases.

Cagliari possesses an abundant supply of pure water; in fact, it is said that the water and the salt of Cagliari are unequalled. The source of the water-supply is among the mountains, twenty-three kilometres distant. It is led in by an aqueduct of somewhat recent construction.

The inhabitants of Cagliari are a sturdy, peaceful, but stubborn people, intellectually bright; they are mostly engaged in fishing and making salt. There are the usual societies for the relief of the poor in Cagliari, besides a poor-house and an orphan asylum for boys and girls. Educational advantages are exceedingly good. In the common schools and lyceums excellent instruction is given, and for those more advanced the university is open. This university contains a medical school of tolerable standing, where, after a four years' course, a diploma is given; a law-school, a school of practical engineering, etc. Lectures in the higher mathematics, geology, natural history, are also delivered by professors of those branches. The institution contains a very good collection of Roman antiquities found in Sardinia, a very complete collection of Phœnician idols, an excellent mineralogical and natural-history collection,



besides a fair anatomical museum. There are no industrial works particularly worthy of mention.

*Porto d'Ajaccio, Corsica.*—There are two hospitals in this port, the Hospice Eugénie, or Civil Hospital, and the Military Hospital for the troops of the garrison.

The Civil Hospital is situated a short distance from the port, and faces the sea. It stands alone, and has the benefit of the sea-breezes. Built in 1856, it is still in good preservation. Its capacity is 150 patients, but it could accommodate more should the necessity exist. At present there are about thirty-six under treatment, principally cases of fever of a malarial nature. There are six large wards, three for male and three for female patients, besides several others for venereal cases, contagious diseases, lying-in women, and very old people. The wards are very well ventilated, scrupulously clean, and good provision is made for heating them during the winter months.

The general comfort of the patients seems to be well attended to, the diet is sufficient and varied, the beds clean and comfortable. The Sisters of Charity are in charge of the nursing of the sick, and also do the cooking. One of their number is the apothecary of the establishment. The pharmacy is a model of neatness. The medical staff numbers three doctors, in good standing; one of them sleeps in the hospital. The hospital is free to the indigent poor of Ajaccio and commune; those who are in circumstances to afford it are charged at the rate of thirty sous for treatment in the general wards; three francs a day in the private rooms, of which there are several. At these charges seamen from American vessels in port would be received without difficulty. As we have no representative here, the captain of the vessel from which the sick man comes would go with him and become security for payment of hospital charges.

The Military Hospital is in the town, fronting on the large parade-ground, and also seaward. It is very well managed,

indeed, quite complete in its appointments, and very clean and well ventilated. One hundred and fifty patients can be comfortably placed here, and double that number provided for should occasion necessitate. At present the hospital is quite full, cases of malarial fever forming the great majority. The sick are admirably cared for, the best of food and wine is provided, and their surroundings are all that can be desired. Sick officers and seamen from foreign men-of-war visiting the port are admitted on a request from the commanding officer, readily. The charge per day for seamen or marines is two francs forty-one centimes; for officers, three francs twenty centimes; sailors from merchant service not admitted. The hospital is under the care of the medical officer in chief of the garrison.

General quarantine laws of France are in force here. On the east shore of the bay of Ajaccio, opposite the town, is a lazaretto of the second order or class, of not large capacity; about thirty or forty persons can be provided for there. Vessels quarantined anchor off this lazaretto. If there are any very sick on board they are sent to the lazaret and can occupy apartments of the first, second, or third class. For the first, the charge is two francs a day; second, one franc; third, fifty centimes. This does not include food, which must be purchased at a sort of restaurant where the prices for articles are fixed by the government. Should a ship be a very large one, and it is thought that the accommodations at this lazaretto will prove insufficient, those most ill are landed, and the vessel with her cargo is then sent to a lazaretto of the first order, as at Marseilles or Toulon.

There are two kinds of quarantine for vessels, one of necessity or severity, *de rigueur*, the other of observation, as when a vessel has sick with pest, yellow fever, or cholera, or black small-pox on board, or has simply come from a port where any one of these exists. There is no time absolutely fixed for either

of these quarantines. The merchandise of infected or suspected vessels is divided into three classes. The first consists of articles which it is obligatory upon the sanitary officers to disinfect, such as clothes, luggage, rags, old and new leather, hides, feathers, horse-hair, bones, woolen and silk goods. The second class, disinfected or not at the option of the health-officers, as cotton, wool, raw hemp. Of the third class, grain, iron, metals in general, resin; these need not be disinfected. There is a wharf or place at the lazaretto where goods are received from vessels in quarantine. They are discharged from these vessels by laborers employed and paid by the owners of the vessels or consignees of the goods. Goods landed and disinfected, are charged for the time they remain at the lazaret, for packed goods (*emballées*), fifty centimes per hundred kilogrammes; leather, one franc for one hundred pieces; small skins, not packed, fifty centimes per one hundred kilos; for old rags for making paper (*drilles*), and *chiffons*, "the expense occasioned by handling and disinfecting them is placed to the account of those who own them"; the expense of disinfecting the vessel to the account of the consignees. Ships pay, for each day they are in quarantine, three centimes a ton. The guard, should any be placed on board, is paid three francs a day. Regular visits of health-officer cost nothing either on board or to persons confined in lazaretto.

Tax of recognition (*reconnaissance*); sanitary dues: Vessels sailing between two French ports pay five centimes a ton; from a foreign port to a French port, ten centimes a ton. For a "long cours," that is a voyage from outside the Straits of Gibraltar, or Red Sea, etc., fifteen centimes a ton.

Men-of-war, vessels driven into port by stress of weather, but having no commercial transactions ashore, and fishing-vessels having no mercantile transactions ashore, even when admitted to pratique are exempted from the foregoing tax.

Vessels arriving here desiring pratique must send their bills of health ashore to the health-office for inspection; should they be clean, pratique is granted verbally and the health-paper kept at the office until the vessel sails, when it is viséed and returned. Should the vessel not depart within forty-eight hours after the bill of health has been viséed, it must be again viséed to be considered correct. A bill of health costs nothing to those making application for it.

The sanitary condition of the town and port of Ajaccio is satisfactory. No diseases of a contagious or infectious nature are prevalent. At present there is an average of one death a day here. Prevailing diseases are fevers, often of a pernicious character, and diarrhoea during the summer, which is considered the most unhealthy season of the year. In winter, affections of the chest, as bronchitis, pneumonia, and joint diseases as rheumatism, take precedence. There is but one recommendation I beg to offer as a precaution to captains of vessels visiting this port during the warm season—not to permit their crews to remain ashore at night. By observing this rule they will avoid malarial fevers, or at any rate escape in great measure.

Physically the inhabitants are robust though of small stature. They are bright enough, and are courteous. There are no charitable or educational establishments worthy of notice or description, and no institutions or art, science, or industry, of any importance.

*Bastia, Corsica.*—There are two hospitals in Bastia, the Civil and the Military.

The former is admirably situated on the verge of the old town, overlooking the sea, and well above it. It is just outside the old bastion from which the town derives its name. The building itself is very old, and in extremely bad repair; it can hardly be believed that it was ever built for a hospital, so badly is it arranged. Instead of there being large wards, the place is cut

up into small rooms, hid away here and there, and approached by winding and narrow stairways. Ventilation was necessarily very poor indeed; decidedly unpleasant odors prevailed throughout the establishment, and especially in the upper wards. There was a general state of untidiness, unneatness, and by no means a high degree of cleanliness. Very few of the modern appliances for the comfort of the sick were to be seen. The latrines were in a wretched condition, and emitted shocking odors; it is left to the rain which falls upon the roof to flush and cleanse them. As far as is practicable, contagious diseases are isolated. The sick of both sexes are received here.

The general management and superintendence of the hospital is intrusted to the Sisters of Charity, while the medical staff consists of a physician and a surgeon, both in good professional standing. The indigent sick of Bastia are admitted gratis; those in better circumstances are charged one franc and a half a day in the common wards, three francs a day should they occupy any of the few private rooms in the building. At these rates sailors from our merchant service would be readily admitted. In justice to the hospital I must state that English sailors placed there by the vice-consul of Great-Britain had no complaints to make, being well satisfied with their treatment.

The capacity of the Civil Hospital is placed at 80 sick; about half that number are now under treatment.

In marked contrast to the foregoing was the Military Hospital of Bastia. At a general inspection of hospitals throughout France and her provinces, made just after the late war, this one is said to have stood second in the list of those whose good condition deserved mention. It is situated on a hill overlooking the town, and a little back of it. It was in past days a convent, but it has been well altered to its present purpose. The wards are large, well heated, well ventilated, and real models

of neatness and cleanliness. Besides these general wards, there are many private rooms, comfortably furnished. A fine garden is at the disposition of the convalescents. There are accommodations here for at least 250 sick; at present there are only 31 under treatment. One surgeon on the retired-list of the army has charge, but he is assisted by the regimental surgeons stationed here with the troops.

Officers and sailors from all foreign men-of-war lying here would be admitted upon application, but no one from the merchant service. The charge is three francs a day in the large wards, four francs and a half in the private rooms.

The quarantine laws and regulations in force here are the same as at Ajaccio. I mentioned them in my report on the latter place.

There was a small lazaretto for the port of Bastia, on the shore some two miles north of the town. I understand that the building is at present used as an eating-house. Should occasion necessitate, it could be speedily refitted. Vessels undergoing quarantine would lie in the new port, and as much by themselves as circumstances would permit. To obtain pratique the bill of health must be sent ashore to the health-office. Should the vessel intend going to an Italian port, before sailing her bill of health must be viséed by the Italian consul.

Sanitary condition of the town and port satisfactory. Bastia has the reputation of being an exceedingly healthy town; at present there is almost no sickness existing. Different diseases prevail at different periods of the year. During the spring, rheumatic complaints, catarrhs, bronchitic diseases; in summer, gastric derangements; autumn, malarial fevers, including those of a pernicious type, the Corsican fever, so called; in winter, various pulmonary complaints, etc. September and October are considered the most unhealthy months of the year.

The average summer temperature of Bastia is 80° Fah.; of winter, 60° Fah. Annual rainfall about 78 centimetres.

The water supplied to Bastia, though excellent in quality, is not abundant. There is usually enough for ordinary purposes, but none to spare. The source is from springs among the mountains behind the town.

The inhabitants are more Italian than French in character. They are shrewd, of quick perception, inclined to be turbulent, persevering in the attainment of an end, but withal lazy.

Educational advantages very good. There is a lyceum and a college kept by the Jesuits. There are no institutions of art, science, or industry worthy of notice or description.

*Arenza, Italy.*—There are no hospitals, either civil or military, in Avenza. The sick are sent either to the hospital at Carrara or at Leghorn. There is a sanitary office where bills of health are received from vessels arriving here, and where pratique is granted, but there is no quarantine station or anchorage. Infected or suspected vessels are sent either to Spezia or to Leghorn, usually the former port.

Sanitary condition of town not satisfactory. The streets, if so the unpaved lanes may be called, are filthy; there is no system of drainage.

As to diseases, diarrhœas prevail in summer and fall, with fevers of a malarial nature, but these do not seem to exist to any very great extent. During the winter and spring rheumatic and bronchial troubles occur. There is no actual unhealthy season.

Inhabitants are peaceful and industrious, engaged almost altogether in handling marble.

There are no institutions of any sort in Avenza.

*Naples, Italy.*—There are seventeen hospitals in Naples, many of them being of small size and altogether unimportant, mere hospices, as they are called. I have personally visited the

most important, and it affords me pleasure to allude to the courteous manner in which I have been received.

The Ospedale degl' Incurabili is the largest and most extensive of the hospitals of the city, as well as one of the richest. It is almost entirely supported by the rents, from various properties appertaining to it, but besides this it receives numerous subscriptions and bequests. Its situation is a most admirable one, as it crowns the summit of a hill in one of the quarters of the ancient town; it possesses a fine prospect and is well exposed to air and light. The buildings form the four sides of a hollow square, the latter being a general thoroughfare. One of the sides is occupied by the offices, the pharmacy, etc., while the other three form the hospital proper. The walls are enormously thick, the staircases of stone and tolerably wide. The establishment is a strange mixture of good and bad, for while in the upper portion, where female patients are placed, the wards are bright, cheerful, well ventilated, and clean, those in the lower stories, for males, though large and vaulted, are ill ventilated, dirty, and depressing, especially the ward exclusively for consumptives; this was a foul-smelling place, wretchedly arranged. The beds seemed to be comfortable, but the linen was not remarkable for cleanliness; it must, however, be remembered that the inmates are drawn from the poorest classes, who are not accustomed to keeping themselves or their surroundings very neat. In all the wards there was abundance of water, supplied from pipes discharging into marble basins. The latrines were in a bad condition. There is no artificial system of ventilation, nor any means of heating the building in cold weather; still, nearly all the year round the windows can be left open. The diet is sufficiently varied, but in quantity not overabundant; the kitchen is under the superintendence of the Sisters of Charity, who also assist in the nursing. Of instruments, the hospital owns a complete assortment, of



good make and novel pattern. A surgical cabinet, already well filled, has recently been commenced, and contains many valuable pathological specimens.

The institution is free to the poor of the city and province, and indigent strangers are admitted gratis. Those who are able to pay are charged two and a half francs a day in the general wards, three to four in the private rooms, of which there are a number. The cases received here are almost always of a chronic or incurable nature and surgical cases; there being, besides, a large lying-in department. There are accommodations for 1,200 patients, and the hospital is always full; were it twice as large, they tell me, there would hardly be an empty bed. I was well pleased with the treatment of the surgical cases; the dressings were neat and clean and well adjusted; special apparatus was used with sense and discretion. A large number of operations of lithotomy are performed here yearly. Out of forty-two cases cut by one surgeon, but two terminated fatally. I was fortunate in seeing two operations of this nature, both of which were done skillfully; ether is used altogether as the anæsthetic. The medical and surgical staff is very large; each of the many sections has its chief, and under him several assistants, all gentlemen of high professional standing in Naples.

The Ospedale Gesù e Maria occupies a commanding, airy situation in a central portion of the city almost on the way to the Castle of Saint Elmo. It was originally a convent, which has been adapted to the purposes of a hospital. It is the clinical hospital of Naples for medical and obstetrical cases; surgical cases are also received and temporarily treated, but they are transferred as soon as possible to the *Incurabili*; cases becoming chronic or incurable are also sent there. Daily clinics are held in all branches for the benefit of the poor who receive medicine gratis, and quite a number attend. The professors of the Medical School of Naples also lecture here on cases brought

from their special wards, and women are delivered, operations are performed and dissections made before the classes; for this purpose there are several well-appointed lecture-rooms in the building. The pathological room is a fine one. There the more valuable specimens are prepared and preserved, and microscopical preparations mounted. The nucleus of a creditable museum is formed in an adjoining room, from these materials. The ground-floor is occupied by the old cloisters, which form a cool and sheltered promenade for the convalescents, and from which open the offices, a good kitchen, store-houses, the dead-room, etc. A quadrangular building is thus formed, with a pretty garden in the centre. On the upper floor, on the four sides, are the wards, a division separating the male from the female patients.

The hospital was almost empty, there being but sixty-seven patients under treatment. The opportunity has been seized for painting and giving a thorough cleaning to the unoccupied wards. There are four or five large wards and many smaller ones scattered about, no particular system existing in their arrangement. The large ones are lofty and arched, with wide windows, at this season of the year open, and admitting abundance of air and light; the smaller ones were poorly lighted and ventilated. There are in nearly all the wards small round holes near the floor, connected with the outside air, for ventilating purposes, but it is evident that they must be quite insufficient when the windows are closed in inclement weather, and I am told that such is the case; they are, however, better than none; fortunately, in so mild a climate closed windows are the exception and not the rule. It is hard to say, in the state of confusion which prevailed, whether strict cleanliness was observed or not. I am somewhat inclined to think the contrary. Food is well prepared, bread good, supply not so lavish as is considered proper in the hospitals of the United

States. The establishment for baths is better and more complete than has been usually found in Italian hospitals, though still far from being perfect; there is abundance of both hot and cold water for the ordinary bath, circular douches, etc., but I saw no vapor-baths. There is a steam-engine on the premises for sending hot water throughout the building. I was told that an apparatus for artificially ventilating the hospital had been introduced, but failing in its object, had been abandoned. Luckily severe weather is rare, or the minute stoves pointed out would by no means suffice for warming the wards. The beds are of iron, with spring bottoms, the mattresses of wool, and comfortable; the linen is apparently not often changed. The institution when full can accommodate 300 patients of both sexes; the poor of the city pay nothing. Strangers are freely admitted to the general wards by paying three francs a day, and from 150 to 300 francs a month in private apartments. The United States consul has selected this hospital as the place to send sick American seamen from vessels lying in the port; they are charged as mentioned above. No complaints have been made as to want of attention, and patients have usually done well there. The medical staff consists of a director, a subdirector, and three assistants. The hospital is under their supervision, but the different wards are apportioned to certain professors of the Medical School, who, with their assistants, are responsible for the inmates. These gentlemen represent the best medical and surgical talent in the city. A physician and surgeon are in daily and nightly attendance. The institution is supported mainly by the municipality, and not very liberally either. It falls far short of what it should be, with such natural advantages as to site and drainage. The latrines are a disgrace.

The Ospedale dei Pellegrini is found in one of the most thickly populated sections of the city, and is aptly compared,

in the words of one of its surgeons, to an ambulance at a camp of war. Its site, however, is by no means a bad one, for it is on a slight incline of ground, and having a large court-yard in front, there is little danger of air stagnating about it. The establishment was originally founded for the benefit of pilgrims, who received food, attention, and shelter. That necessity having ceased, it was converted into a hospital for the reception and treatment of all violent lesions, fractures, luxations, wounds and contusions occurring in men. Women are admitted temporarily in case of accident. It is a true charity, and one that deserves to be widely known, for every one is admitted without question, immediately, and without charge. They are treated until a cure is effected, or the case terminates chronically, when it is transferred to the Incurabili. Should a poor patient have had to suffer amputation of an arm or leg, he is supplied with an artificial one on leaving, from a special fund for this purpose; and not only that, but, in some instances, when the unfortunate may be, from the nature of his injury, incapable of sustaining himself, a pension for life is even granted. There seems to be an absence of "red tape"; if injured and brought here patients are at once received and taken care of. Very many lives must have been saved by this prompt attention. Besides those patients in the hospital, some two hundred are treated outside, in the daily clinics; wounds are dressed, medicines supplied, and advice given without charge. As to the hospital itself, it is very complete, and leaves little to be desired. There are in all, four wards, well ventilated, and lighted by many windows extending from ceiling to floor; in their frames are set circulating ventilators, which serve to admit air when they are closed. The floors are laid with glazed tiles, the ceilings neatly frescoed. The utmost cleanliness was apparent throughout, and there was not the usual hesitation about showing the latrines, for

they were in admirable condition. The hospital lacks a bath-house, but portable baths are used when necessary. The patients seemed very comfortable, the beds were soft and roomy, the linen of good quality and clean. In all cases the latest ideas in the dressing of fractures and wounds were observed, the dressings being skillfully applied. I was surprised at the almost military precision of the institution; there seemed a place for everything and everything in its place. The diet is generous and varied. I was present during the dinner hour; wine is freely used—a good wine of the country, and an excellent Marsala. Ninety patients are comfortably lodged, but many more could be accommodated; the hospital is always full, and now contains very many interesting cases. My impressions were so favorable that I would be satisfied to see placed here surgical cases from our own vessels, should necessity require it.

The hospital is under the care of, and is supported by, the *Arcicon Fraternita*, a charitable brotherhood numbering many thousands. They have establishments of like nature in other cities of the kingdom. It is governed by a board of directors, chosen from their ranks. There are twenty-seven surgeons on the staff of the hospital, surgeons, directors-in-chief, assistants, recognized as being in high professional standing in Naples.

The *Ospedale Marinerea*, or Naval Hospital, is near the *Villa Reale*, facing the bay. It is by no means an elegant establishment, nor one worthy of the government. Its eight wards are simply whitewashed, and the rafters show overhead; the floors are constructed of broad flagging. Still the wards themselves are lofty, well ventilated, and scrupulously clean. Certain diseases are assigned to separate wards, as surgical, venereal etc. The patients appear to be well cared for. The capacity of the hospital is 150; there are usually under treatment about 90 patients. Sick sailors from any foreign men-of-war lying in the harbor would be received here without difficulty, upon

request. The charge is one franc fifty centimes a day in the common wards ; in some fairly-furnished rooms for officers, two francs and a half a day, unless the case be a venereal one, when five francs per day is charged. The hospital is under the care of the medical officers of the Italian navy.

The military hospital here, I did not visit.

Of the various Lock-Hospitals established throughout Italy, for the treatment of venereal diseases among prostitutes, the Sifilocomio de Napoli is perhaps the largest. There is a daily average here of 300 inmates. It is but a prison, for the unfortunates are sent here peremptorily by the inspectors of prostitutes in the city, and are prevented from escaping by bolts and bars. But it is rare in these days to find even a prison in the condition of this hospital, where women are crowded together like malefactors, and, I suspect, treated but little better. There are many wards dispersed here and there through the building, formerly a convent, and they vie with each other in uncleanness and disorder, while all are about equally badly ventilated. The hospital is divided into sections, some classification of cases being made, the grave and the mild being to a certain extent separated, as also primary symptoms and consecutive lesions. Of course no charge is made, the patient being retained until recovery is absolute, when she is discharged, only to return at no distant period. Better fare is provided those who can afford to pay a franc and a half a day. There is a good bathing establishment. The hospital is supported by the government, which is by no means liberal in the expenditure of money for its benefit.

There will be opened, in Naples, a hospital to bear the name of the International Hospital. Sufficient funds have been already raised for its support, and a building selected in a rather distant part of the town. A German physician has been appointed at a salary of 1,500 francs a year. It is proposed that this be

made a strangers' hospital, where sick persons of every nation shall be admitted. There is to be no distinction on account of religion, and patients are to have the privilege of calling, in consultation with the physician of the hospital, any medical gentleman of the city they choose. It is intended to divide the establishment into three classes, distinguished by the price and the various comforts each offers, as well as by the diet. The first it is expected will be so well ordered that strangers, taken sick, will prefer going there to remaining in the hotels. It is not to be a free hospital, although poor foreigners who are worthy would doubtless be cared for, the idea being to make it self-sustaining, after it is well under way, from the charges to patients. At first, subscriptions are to be solicited from foreigners and residents. The capacity was stated to me as about 100 beds. I have only been able to obtain these meagre data, the prospectus and regulations not being ready for distribution.

There are no special quarantine laws and regulations in force; the general laws of the ports, such as govern Leghorn, Genoa, Spezia, etc., are observed here. The quarantine station of Naples is at the island of Nisida, not far distant, where there is a lazaretto, but I was told that the latter is in a miserable condition.

Vessels desiring to obtain pratique must send their bills of health to the sanitary office, as in the other Italian ports; they are not boarded by health-officers.

The sanitary condition of the town and port of Naples was not very satisfactory. Many of the streets were exceedingly filthy, and the water of the port, from the amount of sewage thrown into it, gave rise frequently to bad odors. In spite of this the health of the city was exceptionally good, the death-rate not exceeding twenty-two per thousand of population.

No contagious or infectious diseases were reported. The prevailing diseases are inflammatory affections of the chest, malarial fevers, and rheumatism. Diseases of the eye are not uncommon. The most unhealthy season of the year is the spring.

One of the wants of Naples is, and always has been, a plentiful supply of good water. The inhabitants depend mainly upon their cisterns, and as these, in many instances, are too near the cesspools, contamination is always to be feared. Water brought into town from the mountains is sold at every street corner. In order to remedy this evil, a royal decree has been promulgated granting to an English company the right to introduce water into the city. It is to be brought from the river Selino, in the province of Avelino, distant 37 miles, by an aqueduct. It is said to be excellent, and the supply at all seasons ample. There will be storage-reservoirs near Capodimonte. It will, however, be three or four years before this work is finished.

The Neapolitans are physically quite up to the average; intellectually bright, shrewd, and cunning, it behooves one to be wary in dealing with them. They are quick to quarrel, but slow to strike; inclined to be revengeful. Still, in general intercourse, they are courteous and obliging. The national characteristic is a love of pleasure, and a happy forgetfulness of the morrow.

Among the charitable institutions, the foundling asylum, the *Annunziata di Napoli*, is one of the largest and most interesting; it has an annual income of its own of four millions of francs. It is an immense establishment, occupying an entire square in the heart of the city. Abandoned infants found in the streets of Naples, or among the villages of the province, and those brought to the door are received without question. They are nourished by wet-nurses, two infants being given to one



nurse. The boys are kept until six or seven years of age, the girls for the rest of their life, unless they marry or go out to fill various situations in the city. They are taught many useful industries, such as glove and lace making, embroidering, etc., and receive a good education; music is one of the branches. There were about two hundred infants in the institution at the time of my visit; many more are sent out to be nursed by women who cannot leave their homes. The girls and women numbered nearly two thousand. The goods they manufacture are sold outside. I have never seen a cleaner or better regulated establishment—a cheerful and agreeable home for its inmates. There is also the Casa del Povere, the poor-house, or rather the house of industry, as the boys are instructed in various trades, in the fine arts, and in music. They are provided with situations, when possible, on leaving the institution. There are, besides these, many other charities.

General educational advantages are good in Naples, but the attendance upon the public schools is not large—only 15,000 children attend. There are some Protestant schools, with an average daily attendance of 2,500. The medical school in Naples is said, at present, to be the best in Italy. It numbers among its faculty some distinguished physicians and surgeons. The course of study extends over six years. Its session commences in October. The Zoological Institute of Naples, under the charge of Professor Dohm, is worthy of notice, if only for the aquarium, which probably contains the very best stock of marine animals and plants to be found in the world. In the same building with this are laboratories, and a fine zoological library for the use of the students. The German Government contributes largely to this enterprise.

*Messina, Sicily.*—There are three hospitals in Messina, the

Municipal, the Hospital for the Infirm Poor, and the Military Hospital.

The first is one of the largest hospitals in the kingdom of Italy, occupying an entire square in the centre of the city. It was founded three hundred years ago through bequests and grants of land from the nobility. It enjoys an income at present, of about 100,000 francs. It is a quadrangular-shaped building of stone, stuccoed, enclosing quite an elegant garden filled with fruit-trees and flowers. Within the walls of the hospital is a foundling institution, a *siflo-comio*, and an obstetrical department. The hospital proper consists of sixteen wards and a few private rooms. The wards are divided into those for surgical and medical cases, men and women. They are nearly all large, wide, lofty, and well ventilated, both by numerous windows and artificial openings near the floor; but at the same time they are barren of comfort and most cheerless, besides not being very clean. There are no means of heating them. The beds and bedding were both uncomfortable and unclean; a single hard mattress rested on hard boards in an iron frame, while the latter was in a condition which would not be tolerated in a well-managed institution. There did not seem to be any careful attention paid to the wants of the sick; the nurses themselves looked careless and dirty. The kitchen is a disagreeable place, black with smoke, and correspondingly greasy. The preparation for the morning meal consisted in the cooking of maccaroni and of numerous very small pieces of very tough beef. The bread was heavy and dark. A small quantity of wine is given with the two meals per day. I was told that the physicians could order what they pleased for individual cases. Bathing facilities are very inadequate. The latrines, as usual, were very dirty. The appliances and means of comfort usually found in well-

appointed establishments were wanting here. Certain repairs and improvements are in progress, and it is hoped that the hospital will soon be brought more in keeping with the times. About three hundred sick can be accommodated, there being at present two hundred and fifty under treatment. The hospital is free to the poor of the city and province of Messina. Sick seamen from American vessels lying in the harbor are at once received through an order from the United States consul, who holds himself responsible for all charges. In the general wards the charge is 1 franc per day, everything included; in the private rooms from 2 to 2½ francs a day. The medical staff of the hospital numbers twelve physicians and surgeons from the best medical talent in the city.

The Hospital for the Infirm Poor is on the outskirts of the city. It accommodates two hundred old men and forty-seven old women, paralytics, blind, and those suffering from the many infirmities of advanced life. It is an excellent institution, an admirable charity. Its wards are neat, clean and well ordered, bright and well ventilated. There are at present over two hundred inmates. Those who are able to work are employed at shoemaking, weaving, etc.

There is nothing either novel or striking about the Military Hospital. It occupies a fine site, somewhat removed from the centre of the city. The wards are very large, well lighted and abundantly ventilated, but bare and cheerless. The beds and bedding were miserable, dirty, and uncomfortable. There are accommodations for three hundred sick, about one hundred being now under treatment. Sick sailors from foreign men-of-war or merchantmen would not be received.

Since the closing of the old lazaretto on the left shore of the harbor of Messina, and its conversion into a depot for petroleum, there is no actual quarantine station for this port. It is true that that portion of the harbor in front of the old

lazaretto is still considered as quarantine anchoring-ground, but only for vessels undergoing what is called a quarantine of observation, of five or fifteen days, as the case may be; the disinfection of vessels can take place there, but neither passengers nor cargo can be landed from vessels with any infectious or contagious disease on board; neither are there any accommodations. Such vessels are sent at once either to Varignana, Nisida, or Povellia, in the Gulf of Venice. A visit on board a vessel undergoing observation, made only once by the health officer, costs 2 francs. The guard stationed on board such vessel receives  $2\frac{1}{2}$  francs a day; the bill of health on clearing costs 2 francs. Vessels entering the port are not boarded by the health-officers. The bill of health, together with the log-book, must be taken to the quarantine office, where pratique is granted verbally, should all be right; the bill of health is retained, to be called for when the vessel leaves the harbor. There are no special laws or regulations regarding quarantine in force here. The general laws of Italy are observed.

The sanitary condition of the town and port was in some respects satisfactory, that is to say, the streets were generally clean, but the system of drainage was quite defective; a decided odor can be noticed arising from the openings of the sewers. It is well that the city is so well ventilated by the strong winds blowing through the straits. Messina is by no means an unhealthy place, although in former years it had frequent visitations of pest and cholera, which carried off great numbers of its inhabitants. The most unhealthy seasons of the year are the autumn and the beginning of summer. The prevailing diseases are the various inflammations of the chest, pneumonias, pleuro-pneumonias, pleurisy, bronchitis, and even pulmonary tuberculosis. Rheumatism is not rare, and typhus and typhoid

occur. Malarial fevers are uncommon. The causes of disease are the local winds of the strait, which are very variable and strong, and the changing temperature accompanying them. Rheumatics or consumptives would do badly in Messina.

The inhabitants are small, stout in build, not very intellectual, disinclined to work, but laboring well when they are employed, sober, peaceful, and require but little for their daily wants.

Educational advantages are very good of late years, and the people generally avail themselves of them. There is a university with a good library. There are no charitable institutions of any note; no institution of art, science, or industry, worthy of notice or description.

*Syracuse, Sicily.*—There are two hospitals in Syracuse, the Civil and the Military.

The Civil Hospital occupies an old building in a contracted part of the town, and is anything but a creditable establishment. It has in all about thirty beds, which were almost all occupied. There is one long, low ward for women, and three rooms adjoining for men; all are barren of comfort and far from being clean. The bed-linen and the clothes of the patients were in a bad state. Ventilation was generally good, for in this mild climate all the windows and doors can be left open. The absence of means and appliances necessary for the comfort of patients is due to the want of funds, as I was informed. An extension is contemplated, with improvements in the old part, as soon as money is forthcoming. As the Sisters of Charity have charge of the hospital, and act as nurses, it may be inferred that all that is possible is done for the sick.

The hospital is free to the poor of the city. Sick sailors from any American vessels visiting the port would be admitted through an order from the consul of the United States. The

charge per day would be one franc and sixty centimes. The gentlemen composing the medical staff of the hospital are in good professional standing.

The Military Hospital has a far better site, being on the sea, and in its appointments, etc., more satisfactory than the preceding. Still there remains very much to be desired. One very large ward occupies almost the whole of the interior of an old church; it is very lofty and well ventilated. The other wards are scattered about in outbuildings adjoining, approached through dirty court-yards and dark winding stairs; yet military precision and neatness were observable; the beds were comfortable and clean, also the wards. In all, there are eighty beds. It would be possible to send sick seamen here from an American man-of-war at anchor in the port by special permission, readily granted on demand by the minister of war. The charge could not be accurately stated, but it was thought it would not exceed two francs a day. American seamen from merchant vessels would not be received.

The general quarantine laws of the Kingdom of Italy hold good in Syracuse. There is no lazaretto for this port, vessels arriving with pest, cholera, small-pox, yellow fever, etc., being at once dispatched to either of the lazarettos of Cagliari, Nisida, or Varignana. As at Catania, a quarantine of observation can be carried out, the vessel subjected to it lying apart from others in the spacious harbor. The sanitary dues are the same as at Catania, and the same charge is made for services of guard, doctor's visits, and bill of health.

Vessels are not boarded by the health-officers; the bill of health must be sent to the health-office, and left there until the vessel sails. Pratique is granted verbally.

The sanitary condition of the town was satisfactory. The streets, though exceedingly narrow, are kept quite clean. From the position of the town, the drainage is very good.

An ophthalmia is said to be quite frequent, at times appearing almost epidemically. It is not usually attended with loss of sight, the patients recovering eventually. A gastro-enteritis is enumerated, too, among the prevailing diseases; and in the winter season pulmonary complaints are not uncommon. Intermittent fever is known in the district immediately outside the city, but not in it. The most unhealthy season of the year is the spring.

Syracuse enjoys a milder climate than Catania, I am told; the summers are cooler, the winter season less trying. The water-supply of the port is abundant and good; it has its source among the limestone hills beyond the city. It is said that vessels come here to fill up with water when the supply at Malta is reduced.

The Syracusans are of stout build, bright intellect, and peaceful manners. They have the reputation of working well at anything in hand, but improvident.

The Orphan Asylum and the Asylum for Poor Women are the only institutions of charity of any size. There are no educational establishments of any note and no institutions of art or science. The olive-oil manufactory just outside the walls of the city is the only industrial establishment of any extent.

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#### U. S. S. MARION.

##### REPORT OF SURGEON THOMAS N. PENROSE.

I have to submit the following observations on hygiene, medical topography, etc., made during eighteen months of the cruise of the Marion.

This vessel was built of selected material at Portsmouth, N. H.; was launched December 24, 1873; placed in commission January 12, 1876, and sailed on the 23d of the same month.

After the crew arrived from Boston, and while they were still on board of the receiving-ship at Portsmouth, N. H., they were carefully examined by the medical officers of this vessel; those found to have physical defects unfitting them for the cruise were sent to the hospital, and all who required it were revaccinated before they were transferred to the Marion. Of the large number revaccinated, no case was successful.

The ship proceeded directly to Norfolk, Va. During the passage she encountered bad weather, which proved her to be dry and weatherly.

The Marion remained at Norfolk only a few weeks, when she sailed for Port Royal, S. C., thence to Key West, Brazos Santiago, Texas, and Tampico, Mexico, at which place orders were received to report to the admiral commanding the European Station.

Leaving the coast of Mexico in the early part of June, we arrived at Lisbon, Portugal, towards the latter part of the succeeding month. We remained there about ten days.

Ascertaining that I could procure reliable vaccine virus, I determined to again vaccinate the crew, the vaccination at Portsmouth, N. H., having entirely failed, as already stated.

Through the kindness of Dr. Alvas Brancus, jr., a distinguished surgeon of Lisbon, I procured a quantity of pure, fresh liquid lymph. Of the total of 181 cases vaccinated the result was as follows:

Total number vaccinated.....	181
Presenting evidence of having had small-pox .....	28
Successful .....	7
Unsuccessful.....	21
Presenting good vaccine cicatrix .....	127
Successful .....	29
Unsuccessful.....	98
No evidence of previous vaccination .....	26
Successful .....	4
Unsuccessful.....	22



I have been particular to mark successful only cases in which there was no doubt of the result.

From Lisbon the Marion proceeded to Leghorn, Italy, and afterward visited the following ports in the order named: Smyrna, Constantinople, Villefranche, Spezia, Genoa, Messina, Beyrout, Latakia, and Port Said.

The first six months of the cruise were spent on our own and the Mexican coasts, where the average temperature was 80° Fah.

The sick-rate was unusually large, and was ascribable to climatic influences.

The principal diseases were of the integumentary system.

*Hygiene.*—The complement of this ship is 28 officers and 197 men, but while flag-ship of the European squadron the number was somewhat increased; still I do not think that the average number of those on board for the period embraced by this report ever exceeded 215 souls.

The air-space on the berth-deck when clear is 37,697 cubic feet, from which there is to be deducted the space occupied by the prison, 284 cubic feet; dispensary and three rooms forward, 1,008 cubic feet; coal-bunkers, 5,488 cubic feet; bulk-heading around engine-room, 1,535 cubic feet; bulkhead of boiler-hatch, 1,603 cubic feet; steerage, 2,572 cubic feet; knees, beams, etc., 840 cubic feet; mess-chests, 100 cubic feet; and wardroom, 6,706 cubic feet, making a total of 20,136 cubic feet. There remain for the crew 17,561 cubic feet, from which there must still be deducted 1,000 cubic feet as the space occupied by 165 men, with their bedding and hammocks, when sleeping on this deck. The amount of air therefore allotted each man sleeping on this deck when both watches are below is about 100 cubic feet.

The steerages are very small, and although somewhat enlarged during the cruise, they are still entirely too contracted

for the number of officers occupying them. Their capacity, and the space between them known as the "steerage country," combined, is 2,572 cubic feet. This space divided among twelve officers allots to each only a little more than 214 cubic feet. The total air-space in the wardroom country and state-rooms combined amounts to 6,706 cubic feet, giving to the thirteen officers occupying this space nearly 516 cubic feet of air each. The cabin is large, well lighted, and well ventilated, and has a cubic capacity of 5,150 feet.

The following recapitulation will show at a glance the number of persons occupying each part of the ship referred to, and the air-space allotted to each individual:

Part of the ship.	Number of persons.	Cubic feet of air to each.
Cabin .....	1	5,150
Wardroom .....	13	516
Steerage .....	12	214
Berth-deck (both watches below) .....	165	100

Ventilation is effected by means of six hatches and forty air-ports. The hatches are large, and as the berth-deck is clear fore and aft, the ventilation is fair, much better in fact than is usually found in vessels of this size.

Two stoves on the forward part of this deck, one used by the cook of the commanding officer and the other by the wardroom cook, undoubtedly improve the ventilation in causing an upward current of air through the fore hatch immediately under which they are placed, and thus inviting a flow of air from aft.

The automatic bilge-pumps furnished have never been in working order, and therefore have been useless appendages. In the early part of the cruise the bilge gave some trouble. A thorough examination was made to discover the cause, and it was found that the forward bilge was filled with shavings and

filth left by the mechanics employed in the construction of the vessel. Several bucketfuls of this filth were removed, the bilge thoroughly cleaned and disinfected, which effectually removed the annoyance to which we had been subjected.

The coal-bunkers on both sides of the berth-deck extend from the steerage country to a little abaft the main hatch, a distance of 47 feet, thereby excluding the light which the usual number of air-ports in that space would give. This part of the ship is quite dark during the day, but at night is sufficiently lighted by the ordinary deck-lanterns.

Steam-heaters were provided for the cabin, wardroom, and berth-deck in sufficient number to keep the several places mentioned warm in the coldest weather.

The water used on board was obtained principally by condensation, until our arrival in Europe. That on the Italian coast, as a rule, was found to contain large quantities of saline matter and was therefore rejected, while such as was obtained in ports on the coasts of France and Syria was excellent. At Beyrout it is especially free from organic and saline matter, and is of excellent quality.

*Medical topography.*—The first foreign port visited at which there was an opportunity to communicate with the shore, was Lisbon, Portugal. This city, situated on the Tagus, in latitude  $38^{\circ} 42'$  north, longitude  $9^{\circ} 09'$  west, is a well lighted and a fairly clean city.

The population, according to the last census, taken in 1864, was 169,823. At that time this was believed to be entirely too low a figure, and as the population of the city has since increased very much, it would be reasonable to estimate it now at 250,000.

The supply of water at present is scarcely sufficient for the actual necessities of the inhabitants, but there is now being con-

structed an aqueduct, which, when completed, will supply the city with an abundance of good water.

The sewers are badly arranged, and it often becomes necessary to open the drains in the different parts of the city to remove the foul accumulations. Sickness here is believed to be due to sewage, and to the badly constructed houses, in which hygienic principles are apparently entirely disregarded; also to the insufficiency and bad quality of the water, and to the great and irregular changes of temperature.

As an instance of the sudden changes of temperature, I may mention that on the 20th of July, in one room of the hospital the thermometer stood at 36° centigrade, on the 21st it was 40° centigrade, and the following day it stood at 25° centigrade.

Diseases of the lungs are very prevalent. They exist to a great extent in the Portuguese army, and their origin is ascribed to insufficient food and clothing as well as to climatic influences.

There are several hospitals here, but owing to our limited stay I was only able to visit and procure statistics regarding the largest one, the Hospital of San José. This building was at one time a Jesuit convent, and although much has been done to render it suitable for hospital purposes, it still remains but little more than a grand edifice, four stories high, with three or four wards of good size; there are other wards, small, badly lighted and ventilated. Some of the patients are soon to be transferred to a small modern-built edifice. The construction of two general hospitals on the modern and improved plan of hospital construction is contemplated.

Through the kindness of a member of the surgical staff, I was furnished with statistics of operations performed in this institution for a period of twelve years, and appended to this report I present in a tabulated form a memorandum of the principal operations, with their results.

The report from which these statistics have been taken was made a few years ago, as a means of comparing the results of operations performed in Lisbon with those performed in other large cities, and, together with other reports of similar character, was read before an international medical congress, convened in Paris.

*Statistics of amputations performed at the San José Hospital, Lisbon, Portugal.*

Amputations.	Number of patients.	Cured.	Died.	Percentage of mortality.
Thigh .....	62	33	29	46.8
Leg .....	50	33	17	33
Foot (medio-tarsal) .....	2	2		
Toes .....	16	14	2	12.5
Arm .....	15	10	5	33
Fore-arm .....	24	19	5	20.8
Hand (disarticulation, radio-carpal) .....	1	1		
Fingers .....	73	72	1	1.37
Total .....	243	184	59	24.28

In specifying more completely the data of the preceding table we obtain the following results :

Operations.	Number of patients.	Cured.	Died.	Percentage of mortality.
Disarticulation of the thigh (flap) .....	2		2	100
Amputation of both thighs (circular) .....	1		1	100
Amputations of thigh (1 flap and 58 circular) .....	59	33	26	44.1
Disarticulation of knee (circular method) .....	3	2	1	33.3
Amputation of leg (circular) .....	47	31	16	34
Disarticulation, medio-tarsal .....	2	2		
Disarticulation of the toes (oval and flap) .....	16	14	2	12.5
Disarticulation scapulo-humerus .....	3	2	1	33.3
Amputation of arm (circular) .....	12	8	4	33.3
Disarticulation of fore-arm (anterior flap) .....	1	1		
Disarticulation of fore-arm (circular) .....	23	16	5	21.74
Disarticulation of wrist (circular) .....	1	1		
Disarticulation of the fingers .....	73	72	1	1.37
Total .....	243	184	59	24.28

The maladies which determined the amputations are shown in the following table :

Maladies.	Number of patients.	Cured.	Died.	Percentage of mortality.
Gunshot wounds .....	18	13	5	27.78
Wounds, contused and lacerated, with comminution of bones..	35	29	6	17.14
Fractures (comminuted) .....	63	50	13	20.63
Whitlow .....	20	20		
Vicious cicatrices and ankylosis .....	1	1		
Ulcer, complicated with caries .....	16	9	7	43.75
Gangrene .....	9	5	4	44.44
Caries and necrosis .....	21	19	2	9.52
Tumors .....	40	25	15	37.5
Tubercles in bone .....	1	1		
Chondroma .....	2	2		
Cancer, encephaloid .....	17	10	7	41.18
Total .....	243	184	59	24.28

Classed according to the months during which the operations were performed, we have the following :

Months.	Number of patients.	Cured.	Died.	Percentage of mortality.
January .....	22	15	7	31.82
February .....	19	16	3	15.79
March .....	25	16	9	36
April .....	20	16	4	20
May .....	14	8	6	42.86
June .....	24	22	2	8.33
July .....	25	21	4	16
August .....	26	16	10	38.46
September .....	15	11	4	26.67
October .....	18	17	1	5.56
November .....	17	13	4	23.53
December .....	18	13	5	27.78
Total .....	243	184	59	24.28

The age of patients divided into periods of *ten years*, is shown in the following table :

Age.	Number of patients.	Cured.	Died.	Percentage of mortality.
From 10 to 20 years.....	64	52	12	18.75
From 20 to 30 years.....	70	52	18	25.74
From 30 to 40 years.....	45	35	10	22.22
From 40 to 50 years.....	31	22	9	29.03
From 50 to 60 years.....	22	13	9	40.91
From 60 to 70 years.....	11	10	1	9.09
Total.....	243	184	59	24.28

The cubic space in metres allotted each patient in the several wards is shown in the following table :

Wards.	Number of patients.	Cured.	Died.	Percentage of mortality.
20 to 26 cubic metres of air per patient.....	26	19	7	26.92
41 to 53 cubic metres of air per patient.....	80	56	24	30
69 to 92 cubic metres of air per patient.....	137	109	28	20.43
Total.....	243	184	59	24.28

The greatest mortality has been in wards that have from 41 to 53 cubic metres per patient, say 30 per cent.; then in those in which each patient has from 20 to 26 cubic metres (26.92 per cent.), and finally in those where each patient has from 69 to 92 cubic metres (20.43 per cent.). The fact that the wards having 41 to 53 cubic metres of air per patient show a greater percentage of mortality than those having 20 to 26 cubic metres per patient is partly explained by the better hygienic condition of the wards of smaller air-space, and partly by the special condition of the maladies of those who occupied them.

The following table shows the place and the result of "resections":

Resections.	Number of patients.	Cured.	Died.	Percentage of mortality.
Superior maxillary (cancer) .....	3	2	1	33.33
Inferior maxillary (three times for cancer and once for caries) .....	4	4		
Angle of scapula (caries) .....	1	1		
Humerus (fracture, with protrusion of bone) .....	2	2		
Ulna (cancer) .....	1	1		
Tibia (superior extremity in a case of necrosis, inferior extremity in a case of fracture, with exposure of end of bone) .....	2	2		
Total .....	13	12	1	7.69

*Ligature of arteries.*

Arteries.	Number of patients.	Cured.	Died.	Percentage of mortality.
Subclavian (for aneurism of axillary) .....	1	1		
Primitive carotid (aneurism) .....	2	1	1	50
Brachial (wound) .....	3	3		
Ulna (wound) .....	2	2		
Radial (wound) .....	1	1		
Femoral (2 for wounds of this artery and 7 of popliteal) .....	9	7	2	22.2
Popliteal (wound) .....	1		1	100
Total .....	19	15	4	21.05

The causes of death were as follows: Gangrene following ligature of femoral and popliteal, 3; undetermined, 1.

Lithotomy has been performed twenty-eight times, with the following results:

Lithotomy.	Number of patients.	Cured.	Died.	Percentage of mortality.
Men .....	26	17	9	34.62
Women .....	2	1	1	50
Total .....	28	18	10	35.71



The causes of death were as follows: Cystitis, 6 cases; infiltration of urine and peritonitis, 1 case; pneumonia, 1 case; debility, 2 cases.

There were in twelve years thirty-four operations for strangulated hernia, of which twenty were inguinal, ten were crural, and three were umbilical.

Herniotomy.	Number of patients.	Cured.	Died.	Percentage of mortality.
Men .....	22	9	13	59.09
Women .....	12	5	7	58.33
Total .....	34	14	20	58.82

The causes of death were as follows: Peritonitis, 19 cases; hæmorrhage, 1 case.

Amputation of penis was performed nineteen times, with three deaths and sixteen recoveries; and tracheotomy was performed only four times, with three deaths and one recovery.

There were also four hundred and seven tumours extirpated during twelve years, with three hundred and ninety-one recoveries and sixteen deaths.

Smyrna, in latitude 38° 26' north, longitude 27° 07' east, is situated on a narrow plain at the foot of Mount Pagus. The city at one time was regarded as very unhealthy, and although it has improved somewhat in respect to sanitary affairs, it still remains an undesirable place of residence in the spring and summer months. It is not surprising that it is unhealthy at these seasons, when we for a moment consider its position and the apparent disregard of sanitary measures. The Meles River empties into the sea only a short distance from the city, and the swamps in the valley, separated from Smyrna only by a small spur of Mount Pagus, are the fruitful source of the fevers prevailing in the spring and early summer.

The city is badly drained, and, like most Turkish cities, is badly paved, and very filthy.

The heat of midsummer would be almost insupportable were it not for the strong sea-breeze, known as the "imbat," which begins early in the day, continues until four or five o'clock in the afternoon, and sometimes amounts in force to a moderate gale.

There have been several epidemics of cholera in Smyrna, and dysentery and diarrhoea exist to a great extent during the summer months. At one time the place is said to have been the regular seat of the plague, but for thirty years has been exempt from that disease.

The population is decidedly mixed, being composed of Turks, Israelites, Greeks, Armenians, and French, with a sprinkling of English and Americans.

The foreign element has infused some life in the place within the last few years; new buildings, substantial in construction and handsome in appearance, have been erected, while the quay recently finished adds very much to the appearance of the city and to the comfort of its inhabitants.

Constantinople, the ancient seat of Byzantium, is pleasantly situated on the Bosphorus, and its position is one of great commercial and strategic importance.

The Bosphorus, running to the northeast a distance of eighteen or twenty miles, and the Straits of Dardanelles, stretching far to the southwest and emptying into the Mediterranean Sea, constitute the great commercial highway of Southern Russia and Northern Asia Minor; these straits, with their winding and in some places narrow channels, could easily be rendered impregnable to a naval attack.

The climate is in the main agreeable. Although very hot in summer, the air is at times cooled by breezes blowing from the Black Sea.

The city is divided into several districts. Stamboul, the present name of the old city, or Constantinople proper, is situated on the peninsula between the Golden Horn and the Sea of Marmora. On the northern shore of the Golden Horn, and connected with Stamboul by a bridge spanning this stream, are the districts of Galata and Pera, while across the Bosphorus, opposite to these, is the district of Scutari. Pera is the district in which the Europeans reside, and in its recently-built portion the well-paved, wide, and comparatively clean streets are in strong contrast with the crooked, narrow, and filthy ones of the older part of this district, as well as those of the other divisions of the city.

On the Bosphorus, several miles to the northeast, and near the village of Buyukdereh, stands the Roberts College, established through the munificence of an American gentleman, whose name it bears, and who for many years was a resident of Constantinople. In this institution of learning Christian children of all nationalities are received. The course of instruction is thorough. Under the able management of President Washburne, Roberts College has attained a position of eminence and honor of which Americans may justly be proud.

Constantinople has several military and civil hospitals, but I was unable to visit them by reason of sickness, and I am indebted to Assistant Surgeon R. H. McCarty, U. S. N., for the following account, which he kindly furnished after a visit to the principal ones:

*Maltepe Hospital.*—This hospital was built forty years ago by Sultan Mahmoud, and is at present, as it always has been, a military hospital. It is under the direction of the minister of war, and has two administrative heads, one having charge of the professional services, the other called the economes, whose duties are those of a hospital steward, with the exception of being more extensive and absolute. There are eight physicians,

representing different nationalities, connected with the hospital staff, who are civilians, but enjoy a rank relative to that borne by the surgeons in the Turkish army. Two have the rank of colonel, one that of kaimacam, or lieutenant-colonel, one bombrohi, or major, and four cologassi (pronounced colassy), or captains. The hospital is built in the form of a hollow square, three sides of which are entirely devoted to wards, and are two stories high. The fourth side is but one story high, and is the administrative portion of the institution. There are twenty wards, arranged for the accommodation of twenty beds each. Each ward is about 50 feet long, 20 feet wide, and 18 feet high, having several windows in the outside wall, with a corresponding number on the opposite side, which open into a corridor. This corridor is about half the width of the ward, and extends around the entire three sides of the square. The inner wall of the square, or the outside wall of the corridor, has the same number of windows; the ventilation, therefore, is very good. The building is lighted with oil. The water-supply is abundant, and is furnished by a neighboring spring. The number of patients the hospital was intended to accommodate is 450, but at present there are about 1,000 in the building under treatment, 90 of whom are the subjects of gunshot wounds. The corridors are all occupied by beds, as well as the chapel. No attention is paid to the summer temperature, but in winter the temperature is maintained at 16° Reaumur. The prevalent diseases are pulmonary and malarial, according to the season. Cases of enlarged spleen are very numerous.

*Haidu Pacha Military Hospital* answers to the same description as that of Maltepé, having been constructed about the same time, and under the direction of the same ruler. It was built to accommodate 650 patients, but at present contains 1,300.

The *British Seaman's Hospital* is a small but well regulated institution. When there is a lack of funds it is supported by

the English Government, but for the past ten years it has been entirely self-supporting, the revenue from the English merchantmen having been more than sufficient for its maintenance. It has nine wards, capable of accommodating 60 patients, and if necessary, seventy-five or eighty. It is remarkably well kept at present, under the direction of Dr. Patterson. The building is well lighted and well ventilated, and has very good administrative arrangements. Dr. Patterson has been making the experiment of using sargasso grass for mattress-fillings. The experiment as yet is incomplete; but this material has the great advantage of keeping away bugs and all kinds of vermin, but unfortunately possessing great hygrometric properties, and unless absorption from the body is prevented will prove a great source of infection.

Beyrout, Syria, is situated in latitude  $33^{\circ} 50'$  north, longitude  $35^{\circ} 31'$  east, on a narrow plain backed by the mountains of Lebanon, and has a population of 80,000 inhabitants. The country is productive, and supplies of all kinds are abundant. The city is amply furnished with water, of excellent quality, brought by means of iron pipes from Dog River, a distance of eight miles. In general it may be regarded as healthy.

Malarial fevers prevail to a moderate extent in the spring and fall, and in midsummer about the average number of cases of diarrhœa and dysentery exist as are found throughout the East at that season of the year.

Leprosy does not exist to any extent here, nor in fact anywhere along the sea-coast. It, however, is prevalent in the Damascus region, and Northern Palestine generally.

Hepatic diseases and those of the nervous system are aggravated, while phthisis and bronchial troubles generally are benefited by a residence in this climate.

Stone in the bladder is quite common. Dr. Post, a resident

of Beyrout, to whom I am indebted for many interesting facts has operated successfully one hundred times.

In 1866, through the exertions of some American and English philanthropists, there was established the Syrian Protestant College, and two years later a medical school was established. The course of instruction in the college is very thorough, and from the last official report, a copy of which was presented to me, I have obtained the following interesting account:

A preparatory department was established in 1865, the college was opened in the autumn of the following year, and the medical department was added two years later, as before mentioned. The language of the college is exclusively Arabic. This tongue is the vernacular of Syria, Egypt, Arabia, the Barbary States, and many Moslem kingdoms and tribes in Central and Western Africa, and is the sacred tongue of Turkey, Persia, and large portions of India. The course of instruction of the college embraces the several branches of Arabic language and literature, mathematics, the natural sciences, ancient and modern languages, Turkish, English, and French, moral science, Biblical literature, and the several departments of medicine and surgery. The appliances for instruction in the different departments are becoming—chiefly by the gifts of friends—more available and complete.

The college has already valuable philosophical, chemical, and medical apparatus, a growing library in modern and Oriental languages, an herbarium containing 8,000 species of plants, collections in geology, mineralogy, and zoology, and various antiquities of historical and Biblical interest.

The medical department has awakened a deep interest throughout the country. Hitherto native practitioners have been for the most part grossly ignorant and incompetent. This school furnishes a professional training in accordance with the principles and practice of modern science.

The course of instruction is comprehensive and thorough, and so distributed through the four years a student is required to attend the school, that the various branches are taken up progressively, and no student is allowed to advance to the more practical topics until he has mastered the elements. The number of students is at present thirty. Students applying for admission are examined in the following branches: Arabic grammar, composition, and rhetoric; arithmetic to decimal fractions; algebra to simple equations; geometry to the end of the fourth book of Euclid; elements of geography, history, natural philosophy, and either in the English, French, German, or Italian language.

Studies of the medical course are arranged as follows:

**FIRST YEAR.**—*Winter session:* Chemistry, systematic anatomy, practical anatomy, physiology, Latin (if previously neglected). *Summer session:* Botany and regional anatomy.

**SECOND YEAR.**—*Winter session:* Systematic anatomy, practical anatomy, materia medica, practical pharmacy, Latin. *Summer session:* Clinics and hospital attendance, and zoology.

**THIRD YEAR.**—*Winter session:* Practice of medicine, surgery, clinical medicine, clinical surgery, and hospital attendance. *Summer session:* Obstetrics, diseases of women and children, hospital attendance, and mineralogy.

**FOURTH YEAR.**—*Winter session:* Practice of medicine and surgery, clinical medicine, clinical surgery, diseases of the eye, ear, and skin, and hospital attendance. *Summer session:* Geology, medical jurisprudence, examination of students, and conferring diplomas.

Students are examined annually on branches completed during the year.

The preliminary qualifications demanded of students seeking admission to the medical school at Beyrout, and the high standard of medical education as maintained by its able corps of pro-

fessors, is furnishing to Syria, Egypt, and adjacent countries, thoroughly educated physicians, and the graduates of this school in point of merit take rank with graduates of the best schools of Europe.

The *Hospital of St. John* under the control of the medical faculty of this college, was established in 1866, and is supported by the order of the Knights of St. John, of Berlin. The services of the medical faculty are rendered gratuitously. The hospital is capable of accommodating about 60 patients. The floors are of marble or cement, and the whole establishment is clean, well lighted, and well ventilated. The climate is so mild that the doors and windows can be kept open about 350 days in the year. The entire absence of unpleasant odors throughout the building, and the healthy condition of wounds following operations, prove the excellent ventilation of this establishment, and the attention given to patients. The clinics held at this hospital are large and well attended, and throughout the year there is an average of one important operation performed daily.

Whilst the Marion was at Beyrout I obtained a leave of absence, and visited Jerusalem. My visit was a very short one, but as a brief account of this city may not be uninteresting, I append the following to my report:

Jerusalem is situated about forty miles from Joppa or Jaffa, its sea-port, in latitude  $31^{\circ} 47'$  north and longitude  $35^{\circ} 32'$  east, and is built upon a plateau about 2,200 feet above the level of the Mediterranean Sea, with deep valleys on all sides except the north. To the eastward is the valley of Jehoshaphat, and to the west and south the valley of Hinnom. At the north this plateau is connected with a range of mountains stretching far to the northward in Syria, and being nearly equidistant from the Mediterranean Sea on the one side and the river Jordan on the other, has been named the back-bone of Syria.



Jerusalem by its position is capable of being strongly fortified, the surrounding valleys rendering the advance of an attacking force very difficult.

To a casual observer Jerusalem would appear to possess all that is necessary to constitute a healthy city, built as it is on high land, and so situated that the drainage might be excellent, with apparently a slight effort only, but its insalubrity is a well-established fact, and attracted so much attention a few years ago as to induce investigation as to its cause. This investigation, begun solely with the idea of improving its sanitary condition, finally led to those interesting excavations and discoveries regarding ancient Jerusalem, made by Captains Wilson and Warren, of the Royal Engineers.

The history of Jerusalem shows clearly how different was its sanitary condition in ancient times as compared with the present. Then it was noted for its salubrity, spoken of as the "joy of the whole earth," a "city renowned for its grace and purity," etc., and always referred to in a manner indicating the admiration in which it was held. The pools and aqueducts in and around it show how well the city was supplied with water, and the remains of old drains and sewers prove how much attention was given to that essential hygienic condition, proper drainage.

The city at present depends mainly on the winter rainfall for its supply of water. Nearly every house is furnished with small pools or cisterns, and these are often found in a filthy condition. Apparently no effort is made to prevent contamination of the water from surface-washing during rain, and to the impurity of the water is ascribed much of the sickness prevailing here.

I regret that I was unable to obtain any interesting statistics regarding the hospitals; but my visit being restricted to a few days only, I was compelled to content myself with an exami-

nation of the leper-house, situated about one mile outside of the walls. This building, capable of accommodating about fifty persons, was erected a few years ago by a wealthy English lady, and intended more as a home for lepers than as an institution for any special treatment of this disease. Through the kindness of the superintendent, Dr. Sandreczky, I was permitted to examine the cases, and found the greater number had the tuberculous form of the disease. Those in the advanced stage were indeed pitiable objects. Their faces were literally covered with tubercular enlargements, varying in their measurement from a few lines to a half inch in diameter; the throat was ulcerated, and in some the uvula was entirely eroded. Only two of the inmates admitted that other members of their families were lepers; however, but little dependence could be placed on their statements, as there was an evident desire to conceal all information in this respect regarding them. The hereditary tendency of the disease is undoubted, and some of the physicians regard leprosy and scrofula as allied or congenerous diseases. Dr. Sandreczky, in charge of the leper-home, is of this opinion, and while he thinks that no treatment yet discovered has any curative effect when the disease is in the advanced stage, yet he believes in cases of children much may be done to subdue, if not to eradicate, the disease entirely, and this, he thinks, may be accomplished partly by treatment, but mainly by the adoption of such hygienic means as are calculated to invigorate the system and establish health. At his own expense he has recently established a small home for leper children, and it is to be hoped that his generous and philanthropic efforts will be abundantly rewarded.

## U. S. S. ENTERPRISE.

## REPORT OF SURGEON JAMES M. FLINT.

*Hygiene.*—A report on the general hygienic condition of this ship having been made on the 1st of January last by Passed Assistant Surgeon M. L. Ruth, it is thought unnecessary to repeat the statistics. No changes have been made in arrangements for ventilation, lighting, warming, or food and water-supply since that date. It is proper to state that the berth-deck air-ports are practically worthless as means of ventilation, as it is seldom prudent to open them, even in port, because of their proximity to the water-line.

A careful examination of the air of the berth-deck, taken at 11 o'clock p. m., from midway between decks, near the dispensary, the ship being in port, quarter-watch on deck, temperature of the air 62°, hatches open, gave carbonic acid, 1.297 parts per 1,000—a sufficient evidence of defective ventilation.

At the time of my orders to this ship, October 2, 1878, the Enterprise had recently returned from a survey of the Amazon and Madeira Rivers, having been actually engaged upon those rivers for a period of three months. Though the reports do not show that any unusual amount of sickness prevailed during the expedition, yet subsequent experience has shown the effects of that exposure to malarial influences, in the intermittent type of the various diseases that have since prevailed, and the frequent cases, usually mild, of malarial toxæmia.

*Climatology.*—The meteorological conditions during the past two months have been unfavorable to health. The first weeks of November were cold, damp, and disagreeable.

Leaving New York on the 16th of November, this ship had an extremely stormy passage of thirty-five days to Gibraltar. Rain fell on twenty-nine days, and the greater part of the time the spar-deck was flooded with water, from the spray flying over

the hammock-rail and from the water finding a way through the scuppers and gun-ports. At no time on the voyage was the spar-deck dry.

The record of atmospheric observations, taken three times a day, gives the relative humidity, on spar-deck, at saturation for 65 per cent. of the observations, during the voyage. In the sick-bay, probably the driest part of the berth-deck, being less frequently washed and less frequented by men in wet clothing, the record shows a relative humidity varying from 84 to 91. Average temperature about 65° F. Of course it was impossible, in such a humid atmosphere, that any man should have dry clothing. The result has been a prevalence of catarrhal and rheumatic affections, and more recently a tendency to the formation of abscesses, furuncles, and paronychiæ.

**NORTH PACIFIC STATION.**



## NORTH PACIFIC STATION.

### U. S. S. TUSCARORA.

#### REPORT OF SURGEON GEORGE A. BRIGHT.

The United States ship Tuscarora was put in commission at the navy-yard, Mare Island, California, on January 10, 1878, Surgeon Edward H. Ware being the officer in charge of the medical department of the ship. On the death of Dr. Ware, which occurred August 13, 1878, Assistant Surgeon Millard H. Crawford became the senior medical officer, and continued as such till October 2, 1878, at which time I reported on board for duty.

With regard to ventilation, cubic air-space, and other particulars descriptive of the interior construction and arrangement of the vessel, there has been no change worthy of special notice since the sanitary report for 1873 by Assistant Surgeon John L. Neilson, given in the volume of sanitary reports published in 1875 by the Bureau of Medicine and Surgery, to which, therefore, I respectfully refer for information upon those points.

The Tuscarora has been engaged in surveying upon the coast of Mexico, from the Gulf of California to Tartar Shoals, about seventy miles to the southward of Acapulco. She left San Francisco February 28, 1878, and has, since that time, been at sea 140 days and in port 166 days, having been in port sixteen times, and having visited three ports on the Mexican coast.

In regard to the ventilation between decks, forward, it may be said, or rather reiterated, that while the air-ports and hatches furnish a reasonable supply of fresh air in the day-time and during pleasant weather, at other times, and especially at night, the supply is absurdly defective. There is no passage-

way from the steerage to the berth-deck through which currents of air might pass, and the heated galley remains our only means of compelling ventilation there. In vessels of this sort it seems to me that nothing short of directly forcing fresh air to enter into the stagnant places can be of any real use. In rainy weather, with the hatch covered by a hood, at night the atmosphere below is shocking.

The galley retains, as I have said, its old place on the berth-deck. Undoubtedly it adds very much to the dryness of the air there, and assists the aerial circulation. But it is in the way, occupying a considerable space where there was already none to spare; and in warm weather it must supply, under the most favorable circumstances, a very undesirable increment of heat to those compelled to sleep in its vicinity. The fires are lighted about 3 a. m., after which time sleep would speedily be made difficult. The drying effect of the galley is the less needed, as the deck has a coating of shellac. While at the navy-yard, Mare Island, in November, 1878, I made some representations as to the desirability of changing the place of the galley. The fact was admitted, but it seemed impossible to find a better position for it without making more radical changes than were deemed at that time allowable.

The subject of the bilges of the ship is a very unsatisfactory one. Previous to my joining the ship, I am informed; they were at times so foul that officers were compelled to vacate their state-rooms.

By some miscalculation the Tuscarora was compelled to pass the rainy season on the coast, at which time surveying would be, for days in succession, impossible, as the rain obscured all landmarks. Once, indeed, the rainfall amounted to 9 inches in twenty-four hours. Awnings were necessarily housed and hoods placed over the hatches, so that the atmosphere below was intolerable. Whatever it was possible to do, in the way of



cleaning the bilges and keeping them in decent condition, was done. But the trouble is in the construction of the ship; the parts whence the odors of the bilge emanate cannot be reached; the evil may be palliated for the present, but it cannot be remedied until the hull shall be thoroughly overhauled at a navy-yard, suitable measures applied to the state of things then found to be existing, and means taken, under proper sanitary inspection, to make accessible all parts of the ship liable to become foci of disease. This matter has, of course, been the subject of communication from the surgeon to the commanding officer, and what could be done has been done.

As a measure of the condition of things, I may remark that on one occasion, August 8, 1878, the bilges were cleaned; on the next day, of the men who had been engaged in the work, four were placed upon the sick-list with malarial fever, of which cases one was very severe. I am persuaded that no method can be effective in such a state of things which does not involve a continual carrying away of foul air from regions below the water-line, and the only way probably of effecting this, would be one which has been often proposed, though in our service I do not know that it has ever been put in execution; that is, a system of tubes which should open at one extremity wherever foul air is most prone to collect, while the gases there entrapped should be conducted to a central tube, terminating in the smoke-stack, or, when this is not available, in the galley-funnel. If the foul air is withdrawn, fresh air is certain enough to find a way in to replace it.

There has been no complaint of the food, which has been the Navy ration, supplemented by fresh meat and vegetables whenever a visit to port made such supplies attainable. But in regard to water there has been the same difficulty as during a previous cruise. The apparatus for supplying distilled water has been incomplete. As there is no auxiliary boiler on board,

the steam which is to be condensed is necessarily derived from the main boiler, and this steam, more or less contaminated by oily matters, carries over with it all its deleterious qualities to the water-tanks. This evil has been so marked at times as to render it impossible, except as a matter of absolute necessity, to use it as a beverage or for culinary purposes. The flavor was so pronounced that no disguise could render it palatable; mingled with wine, or in the form of soup, it was unmistakable, nauseous in itself, and ruining the taste of other things. The saline constituents have been less troublesome, but we are yet unable to distill when the ship is rolling much. When last at Mare Island in November, 1878, and the obtaining of an auxiliary boiler was considered, it was discovered that there was no place where one could be put. A part of the time, however, the product of our distiller has been pretty good, if not quite beyond reproach; water has also been received from the shore at Acapulco and La Paz. That from the latter place is said to have been very bad. I do not know, however, that any cases of disease have occurred clearly attributable to impurities in the water. I should say, also, that we have no aerator for our distilled water.

The dispensary is very small and crowded. This inconvenience would be more tolerable but for the fact that the same remark must be applied to the medical store-room. The stores received on our last requisition could not all be contained in the space allotted to us, and a part had to be lodged elsewhere. The dispensary is so situated, unfortunately, that whenever we are coaling ship (and this occurs rather frequently with us, as our duty requires that most of our movements should be made under steam), it is uninhabitable, every bottle and every corner being sprinkled liberally with coal-dust, requiring a considerable time to remove. There is but one dead-light in the dis-

pensary ; the use of artificial light is therefore generally necessary. There is no sick-bay.

To the circumstance of the ship's being kept on the Mexican coast during the rainy season is attributable in great part the large number of sick-days, amounting to 635 for the second quarter, and to the alarming number of 1,783 for the third ; and this with a ship's company of less than 200 men.

I regret not having been able to find on board any record of the exact rainfall during the wet season, as I desired to compare it with the number of men on the sick-list for the same period. While the weather was dry, there was daily exposure for the working parties to the rays of a blazing sun, to which is to be added severe physical labor in climbing hills and transporting the instruments for observation, etc., probably resulting in some impairment of physical vigor. From the middle of July to the end of August was the rainy season, during which the ship was at Acapulco or some miles further south. With the rain came a steady increase in the number of the sick.

On the 21st August the *Tuscarora* left Acapulco for La Paz, Lower California, arriving there August 27. But in the month from July 15 to August 15 the sick-list had grown from 14 to 28, and though the ship did not go south again, but remained in the rainless climate of La Paz, there was no marked or constant decrease in the number of those under treatment ; the number increased, indeed, in the last week of September, and rose to 35 on October 5, after which it steadily fell. On October 3 we left La Paz for San Francisco, and on October 21 there were none reported sick. Fortunately none of the cases terminated fatally ; most of them were uncomplicated remittent or intermittent fevers, though occasionally quite severe ; and there was the unavoidable difficulty of many sick crowded together in narrow quarters, while it often happened that suitable and

palatable diet was not within reach, a common circumstance on board ship.

Of the three Mexican ports visited by the Tuscarora, I have seen but two, La Paz and Acapulco. The former was reported upon in 1873 by Assistant Surgeon Edward Evers, of the Narragansett, and I have no additional information to give about it. Since my connection with the ship we have been less than three weeks in Mexican waters.

Acapulco is specially worthy of mention by reason of its harbor, which is admirable, being very capacious, with good holding-ground, and so encircled by hills as to be secure whatever wind may blow. But this last particular serves to add to the insalubrity caused by the combined heat, moisture, and neglect of cleanliness, preventing any complete circulation of fresh air either from seaward or from the opposite quarter. There is also a marsh to the eastward of the town, said to be fruitful of emanations unhealthy and disagreeable. I believe there are no medical statistics, official at least, of Acapulco, which probably merits its reputation for unhealthiness. It is a decaying city, with little commerce and no manufactures. There is no registry of births and deaths, I am informed.

There is a small number of troops here, but no hospital, either military or civil. There is a small building, erected years ago as a hospital, which has never been used, and is a mere empty shell.

By instructions from the department, officers and men were prohibited from remaining on shore at Acapulco after sunset.

## U. S. S. ALASKA.

## REPORT OF SURGEON WILLIAM K. VAN REYPEN.

The Alaska went in commission April 23, 1878, at the navy-yard, New York.

Complement of officers and men, 304; cubic feet of air-space allowed each man on berth-deck, 88. The ventilation of this ship is everywhere excellent except in the after part of the wardroom and wardroom-pantry. Various expedients have been resorted to in order to remedy this defect, but the confined and unwholesome air can only be removed by means of a funnel running up through the after part of the cabin and opening above the poop. Although we have only the usual arrangement of air-ports, hatches, and windsails, I have never seen a better ventilated berth-deck.

The Hitchcock lamps, with which this ship is supplied, furnish an unexceptionable artificial light. The cabin and wardroom lamps answer every requirement, and the four lamps lighted at night on the berth-deck give it the brilliancy of a ball-room.

The ship is well heated by steam-coils in the cabin, wardroom, steerage, berth-deck, and sick-bay.

Condensed water has been used except at Rio Janeiro, Talcahuana, and Panama, where good shore-water can be obtained. The condenser of this ship furnishes excellent water, only deficient in aeration.

The usual Navy ration is supplied. It is sufficient in quantity and generally good in quality. The addition of canned tomatoes to the ration would be appreciated by the men.

The material furnished is good, and the men make their own clothes. It is to be regretted that the only head-covering as yet devised for the men consists of an additional weight to their winter caps.

The ship's company has been exceptionally free from preventable diseases. The odor of bilge-water is almost unknown. The bilges are kept clean, disinfected, and as dry as possible, the holds clean and whitewashed, and the berth-deck scrubbed or holystoned as occasion requires. With the assistance of drying-stoves the deck can soon be relieved of its surplus moisture.

On the passage from New York to this port (Panama) the vessel touched at Pernambuco, Rio Janeiro, Sandy Point, Talcahuana, Valparaiso, Callao, Payta, and Tumbey; but our stay in each port was too limited to obtain trustworthy statistical information. The medical topography of these places, moreover, has already been described by other medical officers. We arrived in Panama October 11, during the rainy season, which, although it has moderated, has not yet ceased. Of the discomforts attendant upon a vessel's stay in this port during the rainy season, only those who have experienced them can form a proper estimate. During the first few weeks very many mild cases of diarrhoea or intermittent fever presented themselves, the majority of them not sufficient to necessitate the excusing from duty of any of the more active men. The cases soon yielded to treatment, and the use for a time of quinine and brandy as a preventive has maintained as satisfactory a condition of health among the officers and crew as is possible in this climate. There is a Strangers' Hospital here, but I do not think that any medical officer would willingly transfer patients from his own charge to that of the physicians of Panama.

# ASIATIC STATION.





## ASIATIC STATION.

### U. S. FLAG-SHIP MONONGAHELA.

#### REPORT OF SURGEON EDWARD S. BOGERT.

We arrived at Bombay, India, December 30, and remained until January 11, 1878. The population is said to be over 700,000, comprised mainly of Hindoos and Mahomedans, with about 50,000 Parsees and 10,000 English. The climate in winter is agreeable, with an average temperature of about 70° F. In summer the average is said to be 85° F. The amount of rainfall is nearly 90 inches per annum, the greater part of which falls in the summer months, during the prevalence of the southwest monsoon.

The water-supply of Bombay is from the Vihar Lake, some sixteen miles from the city. The quality is fair, but the water contains a considerable amount of organic matter, which varies with the season of the year and with the rainfall. The drainage of the city is not very thorough.

The hospital accommodations are ample, there being two for the treatment of the native population, and one the European General Hospital for the reception of foreigners only. The latter is well situated on the water-side, near that portion of the city inhabited by the foreign population. It contains 130 beds, comprises three detached buildings, and is apparently very well managed and kept in good order. The present hospital buildings are quite new. The medical service is rendered by medical officers of the army on detached duty, although it is purely a civil hospital.

From the reports of the health-officer for the year 1876, I gather the following particulars regarding the mortality and

prevalent diseases of the city. The annual death-rate varied in the quarterly periods of the year from 32.63 to 28.57 per thousand. There had been an epidemic of small-pox during the early part of the year, which raised somewhat the death-rate. The most prevalent disease seems to be remittent fever, it having caused nearly 25 per cent. of the total number of deaths reported. The other important causes of death are variola, dysentery, diarrhœa, and cholera. I was informed that cholera, although probably always present in summer, does not usually assume an epidemic form in Bombay. I find 378 deaths reported from that disease during the year.

*Shanghai, China.*—The greater portion of the year has been passed at this place. As the Bureau has doubtless been fully informed as to the climatology and medical topography of Shanghai, it will be unnecessary for me to do more than to relate our experience at that place. The weather during the latter part of July and throughout the month of August was extremely warm and oppressive, the thermometer on several occasions registering 102° F. under the awnings. There was a marked prevalence throughout the spring and summer months of diarrhœa, which, however, was fairly amenable to treatment. In August a number of the cases of diarrhœa assumed something of a choleraic character, with serous discharges and a tendency to muscular cramps. About the same time it came to be known that there was a good deal of sickness prevailing among the native Chinese in the city; but no definite information as to the nature of the sickness or the rate of mortality was attainable, at least by foreigners. At that time there were a number of native workmen on board the ship every day engaged in the work of repairing the boilers.

On the 31st of August Asiatic cholera was recognized in the case of a man who had been under treatment for diarrhœa for two or three days. There was well-marked collapse, with all the

usual symptoms of cholera in the cold stage. Reaction took place towards evening; but the urinary secretion was not re-established, and he finally died from uræmia on the sixth day after the commencement of the disease.

The second case reported on the morning of September 1; there was well-marked collapse, and he died the next day without reaction. Another case occurred on the 1st, and on the morning of September 2 three more were attacked. These were mild in character, and all recovered, although convalescence was very slow in some of them.

On September 2, on making inquiry on shore, it was ascertained that several cases of cholera had occurred among the foreign residents of Shanghai, and that there was great mortality among the natives, supposed to be due to the same disease, although nothing definite could be learned in this respect. In view of all the circumstances, one death having already occurred on board, and five being sick at the time, three having been attacked that morning, Monday, September 2, it was recommended to the commanding officer that the ship be taken to sea, which was promptly done the same day. By thus removing the ship's company, and by careful disinfection of all dejections from those sick, as well as the ship's head and water-closets, further spread of the threatened epidemic was happily avoided.

About the 1st of October the *Monongahela* returned to Shanghai. There had then been no case of cholera among the foreign residents for two weeks, and the health of the native city was said to be much improved. About the middle of October one of the ship's company died of pneumonia following a severe attack of choleraic diarrhœa. Within a few days of the death of this patient there were four cases of cholera admitted to the Shanghai General Hospital, two of which were fatal. At

the same time another fatal case occurred on board the Peninsular and Oriental mail-steamer lying in the harbor.

In view of the occurrence of these several cases of cholera at the time my patient died, I now think the case should be considered as one of the same disease, complicated by pneumonia. A few days subsequently a similar case of choleraic diarrhœa occurred on board in the person of the orderly sergeant. He was immediately transferred to the hospital on shore, where his disease was pronounced to be cholera. He recovered promptly.

If I may include the last two cases, there have occurred on board the Monongahela during the season eight cases of cholera, with three deaths.

From so limited an experience, I have nothing to suggest in the way of treatment, except to remark that, in one of the cases of collapse, I used hypodermic injections of chloral hydrate, which, I was informed, when in Bombay, was a favorite mode of treating such cases in India. I thought at the time it acted well, and I am disposed to give it a further trial should the occasion occur.

## NORTH ATLANTIC STATION.

631

*Temperature of various parts of the United States ship Powhatan during a cruise to the West Indies, &c., 1879.*

[Forwarded by P. A. Surgeon William S. Dixon.]

Date.		Fore hold (average).		After bilge (average).		Berth-deck temperature (average).	Spar-deck temperature (average).
		A. M.	P. M.	A. M.	P. M.		
Feb.	1	At sea.....				52	40
	2	do.....				52	46
	3	do.....				50	61
	4	do.....				57	67
	5	do.....				72	74
	6	do.....				77	78
	7	do.....				79	80
	8	San Juan, Porto Rico, West Indies*	65	65	74	76	77
	9	do.....	65	65	73	74	79
	10	do.....	72	72	75	75	79
	11	At sea.....	74	73	75	74	79
	12	Charlotte Amalia, St. Thomas, West Indies	73	74	76	75	81
	13	do.....	74	74	75	80	81
	14	do.....	77	75	75	75	82
	15	Frederickstadt, Santa Cruz, West Indies (5 hours of this day at sea).....	71	73	78	74	81
	16	do.....	78	76	76	75	79
	17	do.....	78	78	77	76	81
	18	At sea.....	78	78	75	75	81
	19	do.....	78	78	76	75	79
	20	do.....	77	77	75	76	79
	21	Port au Prince, Hayti, West Indies	81	80	75	76	74
	22	At sea.....	81	80	75	76	77
	23	do.....	78	77	75	75	79
	24	do.....	78	81	77	77	81
	25	Havana, Cuba.....	79	79	77	77	81
	26	do.....	80	79	75	77	82
	27	Havana, Cuba (6 hours at sea).....	79	78	76	76	79
	28	Key West, Fla. (6 hours at sea).....	76	76	75	75	79
Mar.	1	Key West, Fla.....	75	74	75	76	82
	2	do.....	73	73	74	75	79
	3	do.....	72	73	74	75	77
	4	At sea.....	70	70	75	75	75
	5	do.....	74	73	75	75	72
	6	do.....	72	72	72	72	73
	7	do.....	73	72	72	72	77
	8	do.....	75	75	73	72	75
	9	do.....	75	75	74	73	72
	10	do.....	78	78	75	75	72
	11	do.....	78	80	79	79	70
	12	Puerto Cabello, Venezuela, South America	79	79	80	80	72
	13	do.....	81	80	79	79	73
	14	At sea.....	80	80	79	79	81
	15	do.....	81	80	80	80	81
	16	do.....	81	80	80	80	79
	17	Charlotte Amalia, St. Thomas, West Indies	79	79	79	79	81
	18	do.....	80	80	80	80	82
	19	do.....	80	80	80	80	79
	20	do.....	78	78	78	78	79
	21	At sea.....	75	75	78	78	79
	22	do.....	74	74	76	76	77
	23	do.....	74	74	76	76	73

\* Yellow fever prevailing in epidemic form in the town.

*Temperature of the various parts of the United States ship Powhatan, &c.—Cont'd.*

Date.		Fore hold (average).		After bilge (average).		Berth-deck temperature (average).	Spar-deck temperature (average).
		A. M.	P. M.	A. M.	P. M.		
Mar. 24	At sea .....	75	75	75	76	68	67
25	do .....	72	72	75	76	68	62
26	do .....	61	60	72	71	70	51
27	Norfolk, Va .....	67	67	70	71	68	61
28	do .....	69	70	70	72	64	52
29	do .....	67	67	68	70	64	61
30	do .....	67	66	66	67	60	47
31	do .....	65	64	65	66	57	49

*Summary of prevalent forms of disease on home and foreign service for the year ending December 31, 1875.*

[Compiled from reports on file in the Bureau of Medicine and Surgery.—J. B. P.]

STATISTICS FOR 1875.

633

Station	North Atlantic.	South Atlantic.	European.	Pacific.	Asiatic.	Special service.	School and practice.	Coast Survey.	Total.	
	Cases treated.	Cases treated.	Cases treated.	Cases treated.	Cases treated.	Cases treated.	Cases treated.	Cases treated.	Cases treated.	Deaths.
Aggregate number of men	3,489.	1,124.	1,182.	1,782.	1,489.	560.	400.	115.	10,141.	
Order and class.	Disease.	Deaths.	Deaths.	Deaths.	Deaths.	Deaths.	Deaths.	Deaths.	Deaths.	Deaths.
Class										
ZYMOTIC DISEASES.										
Miasmatic diseases.										
	Catarrhus epidemicus	6		3	6		15		30	3
	Cholera epidemica				4				4	
	Cynanche parotidea	5		1	2	1			9	
	Erysipelas								1	
	Febris continua simplex		6	4	4				17	1
	Febris enterica	34	33	19	1	3			94	
	Febris flava	9	4	1					20	1
	Febris intermittens	24	6						26	6
	Febris remittens	215	42	153	106	36	11	6	590	
	Morbilli	58	2	4	34	2		1	105	1
	Varicella				1				1	
	Varicela		2						2	
	Varicella	1	1		11				12	2
	Varicellæ				2				2	
	Varicellides				13				17	
	Varicella									
Order II.										
Euthetic diseases.										
	Syphilis primitiva	108	44	58	70	5	2	6	250	1
	Syphilis consecutiva	23	15	14	58	3	1	9	150	
	Gonorrhœa	53	24	37	32	3	3	10	236	
	Ophthalmia gonorrhœica				1				1	





<i>Order III.</i>	<i>Tubercular diseases.</i>					
Serofula.....	4			2	1	7
Tuberculosis.....	4			3	1	8
<i>PARASITIC DISEASES.</i>						
Vermes .....	3	1			1	9
Draconculus.....	2			2		4
<i>LOCAL DISEASES.</i>						
<i>Diseases of the nervous system.</i>						
Apoplexia.....	2	2		1	1	4
Cephalalgia.....	24	--		13	22	87
Chorea.....	1	1		1		3
Dementia.....	3	3		7	3	21
Epilepsia.....	14	5		15	2	53
Involutio.....	4				4	8
Irritatio spinalis	1			2	1	3
Mania.....	1	1			3	4
Melancholia.....	2	1		2		3
Menigitis.....	1				4	5
Narcolepsia.....	1					2
Nostalgia.....	42	16		7	16	120
Paralysis.....	7	1			3	8
Pneurodynia.....	6	1		1	1	12
Rheumatismus.....	2				4	4
Lumbago.....	1				1	1
Vertigo.....	2					2
Imbecillitas mentis	1					1
<i>Diseases of the eye.</i>						
Anasarca.....	1	1		1	1	4
Cataracta.....	1	1			3	3
Conjunctivitis.....	26	7		18	13	75
Iritis.....	1			5	2	10
Ophthalmia.....	4	4		2	4	19
Pterygium.....	1	1		5	3	2
Opacity of cornea	1			1		1
Myopia.....	1					1
Ulcus cornese	1			2		3
Mydriasis.....	1					1



Bronchitis acuta	65	29	11	24	52	26	4	8	219
Bronchitis chronica	23	9	2	19	3	1	2	1	59
Catarrhus	67	11	47	45	53	8	9	5	245
Epidæmia	1								2
Laryngitis	10	4	1	1	2				10
Phthisis pneumonica acuta	2	2	4	2	1				20
Phthisis pneumonica chronica	15	3	9	7	12	4			56
Pleuritis	12	7	2	9	9	7			51
Pneumonia	13	1	2	6	1			1	30
Hæmoptysis	3	3	1	3	5	1			7
Pertussis	1				1				1
Pleuro-pneumonia	1								1
Pleurodynia				2	1				3

<i>Diseases of the digestive system.</i>									
Ascites			2						2
Cholera morbus	26	5	13	64	1	3	10	5	131
Cirrhosis hepatis									1
Colica	32	20	5	14	26	4	8		109
Constipatio	14	10	3	6	4	6	15	9	67
Diarrhœa acuta	106	22	37	86	217	40	24	10	542
Diarrhœa chronica	14	3	1	5	15	1	3	1	43
Dysenteria acuta	30	11	6	27	43	7	8	21	153
Dysenteria chronica	5		1	10	1				20
Dyspepsia	28	10	2	11	4	3	18		81
Fistula in ano	4	1	1	4	2				12
Gastritis	7	2	1	6		3			18
Hæmatemesis				1					3
Hæmorrhœis	26	3	4	13	1	3		1	62
Hepatitis acuta	4			3	12				7
Hepatitis chronica	3	3		4	2				9
Icterus	6	4	4	1	6				24
Peritonitis	1	2	2	7	1	3			3
Pharyngitis	7								22
Prolapsus ani	2			1					3
Splenitis	1				1				2
Stomatitis	2			3					15
Tonsillitis	41	22	15	15	7	11	4	1	116
Fissura in ano		1							1
Nausea		1							1
Œsophagi strictura		1							1

[illegible]

Bronchitis acuta .....	65	29	11	24	52	26	4	8	219
Bronchitis chronica .....	23	9	2	15	3	1	2	5	59
Catarrhus .....	67	11	47	49	53	8	9	245	2
Epilepsia .....	1	4	1	1	2	1	1	10	10
Laryngitis .....	2	2	4	2	2	1	1	20	56
Phthisis pneumonies acuta .....	10	2	4	7	12	4	7	58	5
Phthisis pneumonies chronica .....	15	3	9	1	19	7	9	51	2
Pleuritis .....	12	7	2	9	6	1	1	30	3
Pneumonia .....	13	3	1	6	5	1	1	7	7
Hæmoptysis .....	2	1	2	3	1	1	1	1	1
Peritussis .....	1	1	1	1	1	1	1	1	1
Pleuro-pneumonia .....	1	1	1	1	1	1	1	1	1
Pleurodynia .....	1	1	1	2	1	1	1	3	3
<i>Diseases of the digestive system.</i>									
Ascites .....	26	5	13	64	1	3	10	5	2
Cholera morbus .....	32	20	5	14	26	4	8	1	131
Cirrhosis hepatis .....	14	10	3	6	1	1	1	1	1
Colica .....	106	22	37	86	217	40	15	9	100
Constipation .....	14	3	1	5	15	1	3	10	67
Diarrhoea acuta .....	30	11	6	27	43	7	3	1	542
Diarrhoea chronica .....	5	1	1	10	1	1	8	21	43
Dysenteria acuta .....	28	10	2	11	9	3	18	1	153
Dysenteria chronica .....	4	2	1	4	2	1	1	1	81
Flatulæ in ano .....	7	1	1	6	1	3	1	1	12
Gastritis .....	1	1	1	1	1	1	1	1	18
Hæmatemesis .....	26	3	4	13	1	3	1	1	3
Hæmorrhoids .....	4	2	1	3	12	3	1	1	62
Hepatitis acuta .....	3	2	4	4	2	3	7	7	7
Hepatitis chronica .....	6	4	4	4	6	4	4	9	9
Icterus .....	1	1	1	1	1	1	1	24	24
Peritonitis .....	7	2	2	7	1	3	3	3	22
Pharyngitis .....	2	1	1	1	1	1	1	3	3
Proctitis ani .....	1	1	1	1	1	1	1	1	1
Splenitis .....	2	1	1	1	1	1	1	1	1
Stomatitis .....	41	22	10	3	7	11	4	1	13
Tonsillitis .....	1	1	15	15	7	1	1	1	116
Tracheitis .....	1	1	1	1	1	1	1	1	1
Ulcera in ano .....	1	1	1	1	1	1	1	1	1
Nævus .....	1	1	1	1	1	1	1	1	1
Esophagi stricture .....	1	1	1	1	1	1	1	1	1

Summary of prevalent forms of disease on home and foreign service for the year ending December 31, 1875—Continued.

Station	{	North Atlantic.		South Atlantic.		European.		Pacific		Asiatic.		Special service.		School and Coast-Survey.		Total.
		Cases treated.	Deaths.	Cases treated.	Deaths.	Cases treated.	Deaths.	Cases treated.	Deaths.	Cases treated.	Deaths.	Cases treated.	Deaths.	Cases treated.	Deaths.	
A aggregate number of men																
		3,489.		1,124.		1,182.		1,782.		1,489.		560.		400.		10,141.
Order and class.	Disease.	Deaths.		Deaths.		Deaths.		Deaths.		Deaths.		Deaths.		Deaths.		Deaths.
		Cases treated.	Deaths.	Cases treated.	Deaths.	Cases treated.	Deaths.	Cases treated.	Deaths.	Cases treated.	Deaths.	Cases treated.	Deaths.	Cases treated.	Deaths.	
CLASS IV ..	LOCAL DISEASES—Continued.															
Order VIII.	Diseases of the urinary and genital system.															
	Albuminuria .....	2										1				3
	Calculus .....									4						4
	Cystitis .....	7		1		1		2		2		1		1		14
	Diabetes .....							1	1							1
	Dysuria .....	1				1		2						1		5
	Ischuria .....					2										2
	Nephritis .....	1		2		1		1		2		1				8
	Oorchitis .....	27		11		22		22		61		2		2		147
	Paraphimosis .....	1														1
	Phymosis .....	2				5		2		3		1				12
	Enuresis .....			1		4		3								9
	Fistula vesicæ .....	1				2										3
	Hæmaturia .....	1										2				3
	Hydrocele .....							1		4						6
	Urethre stricture .....	5		7		6		4		6		2		2		32
	Varicocele .....	2		1				1		3				1		8
Order IX ..	Diseases of the locomotive system.															
	Arthritis .....	2				1										4
	Ankylosis .....									3						3
	Caries .....	1										1				2

[illegible]

Summary of prevalent forms of disease on home and foreign service for the year ending December 31, 1875—Continued.

Station	{		European.	{		Asiatic.	{		Special service.	{		School and Coast Survey.	{		Total.
	North Atlantic.	South Atlantic.	Cases treated.	Deaths.	Cases treated.	Deaths.	Cases treated.	Deaths.		Cases treated.	Deaths.	Cases treated.	Deaths.	Cases treated.	Deaths.
Aggregate number of men.....	3,489.	1,124.	1,182.	1,782.	1,489.	560.	400.	115.	10,141.						
Disease.															
CLASS VI.															
Order I.															
VIOLENT DISEASES AND DEATHS.															
Wounds, injuries, and accidents.															
Abrasion.....	22	8	14	14	11	2	7	—	78	—	—	—	—	—	—
Amblyopia.....	19	7	9	12	5	4	4	1	60	—	—	—	—	—	—
Concussio cerebri.....	2	1	3	20	4	—	—	—	39	—	—	—	—	—	—
Contusio.....	104	39	61	76	58	25	30	4	367	—	—	—	—	—	—
Explosio.....	26	8	4	—	4	1	1	—	1	—	—	—	—	—	—
Fractura.....	13	7	7	14	2	1	2	—	58	—	—	—	—	—	—
Hernia.....	12	—	3	10	2	2	—	—	42	—	—	—	—	—	—
Luxatio.....	70	14	47	51	33	2	1	—	30	—	—	—	—	—	—
Concussio spinalis.....	2	1	1	1	1	—	—	—	217	—	—	—	—	—	—
Strumma.....	2	—	—	—	—	—	—	—	6	—	—	—	—	—	—
Submersio.....	121	14	58	40	35	4	8	—	292	—	—	—	—	—	—
Veneratio.....	32	14	18	25	10	4	7	—	132	—	—	—	—	—	—
Vulnus contusum.....	31	1	4	17	6	2	—	—	61	—	—	—	—	—	—
Vulnus laceratum.....	8	4	14	6	1	1	2	—	43	—	—	—	—	—	—
Vulnus punctum.....	2	2	—	—	—	—	—	—	5	—	—	—	—	—	—
Vulnus sclopetarium.....	2	—	—	—	—	—	—	—	7	—	—	—	—	—	—
Vulnus venenatum.....	1	—	—	—	—	—	—	—	1	—	—	—	—	—	—
Malingering.....	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total.....	2,400	733	905	1,570	1,567	329	251	137	7,832	49					



## Summary of prevalent forms of disease on home and foreign service for the year ending December 31, 1876.

[Compiled from reports on file in the Bureau of Medicine and Surgery.—J. B. P.]

Station	{	North Atlantic.		South Atlantic.		European.		Pacific.		Adatic.		Special service.		School and Coast Survey.		Total.	
		Cases treated.	Deaths.	Cases treated.	Deaths.	Cases treated.	Deaths.	Cases treated.	Deaths.	Cases treated.	Deaths.	Cases treated.	Deaths.	Cases treated.	Deaths.	Cases treated.	Deaths.
Aggregate number of men		5,920.	430.	1,238.	1,093.	1,304.	301.	742.	110.	11,138.							
Order and class.	Disease.																
CLASS I....	ZYMOTIC DISEASES.																
Order I....	Miasmatic diseases.																
	Catarrhus epidemicus	5		35						3				12		55	
	Cholera epidemica									1						1	
	Cynanche parotidea	1															
	Diphtheria	8	2	1		5		10						1		28	
	Erysipelas			5		1										5	
	Febris cerebro-spinalis			15		1		6								102	
	Febris continua simplex	58		1		1		1								12	
	Febris enterica	7		1		1										1	
	Febris intermittens	195	11	49		86		20						6		453	
	Febris recidiva	1															
	Febris remittens	38		7		7		7						2		76	
	Febris typhodes	4														2	
	Morbilli	1														4	
	Phagedena putris							1								2	
	Scarlatina	2						3								2	
	Varicella	1														1	
	Varicella	2						3								5	
	Vaccinia			1												1	
Order II....	Ethetic diseases.																
	Syphilis primitiva	93	19	40		41		65				2		9		271	
	Syphilis consecutiva	53	13	10		19		49				1		2		153	
	Gonorrhoea	65	19	12		62		70				4		6		250	
	Bubo	7						5								12	
	Chancreoid	1	3					9								13	



CLASS III..		PARASITIC DISEASES.											
		Scabies .....	1	1	1	2	1	1	1	1	1	1	3
		Vermes .....	2	1	1	1	1	1	1	1	1	1	4
		Tenias lata .....	1	1	1	1	1	1	1	1	1	1	1
CLASS IV..		LOCAL DISEASES.											
Order I....		<i>Diseases of the nervous system.</i>											
		Apoplexia .....	8	2	1	1	1	1	1	1	1	1	9
		Cephalalgia .....	37	1	3	6	1	19	2	3	1	1	71
		Cerebritis .....	1	1	1	1	1	1	1	1	1	1	1
		Chorea .....	1	1	1	2	3	3	1	1	1	1	16
		Dementia .....	16	1	3	6	8	2	6	1	1	1	34
		Epilepsia .....	5	1	1	1	1	2	1	1	1	1	9
		Insolatio .....	1	1	1	1	1	1	1	1	1	1	2
		Irritatio spinalis .....	1	1	1	1	1	1	1	1	1	1	5
		Mania .....	3	1	1	3	1	1	3	1	1	1	9
		Melancholia .....	2	1	1	1	1	1	1	1	1	1	9
		Meningitis .....	1	1	1	1	1	1	1	1	1	1	2
		Neuralgia .....	71	3	12	44	27	6	6	5	1	1	168
		Paralysis .....	2	1	2	1	1	1	1	1	1	1	7
		Vertigo .....	6	1	1	1	1	1	1	1	1	1	9
		Congestion of the brain .....	2	1	1	1	1	1	1	1	1	1	9
		Pneurodynia .....	2	1	1	1	1	1	1	1	1	1	2
Order II....		<i>Diseases of the eye.</i>											
		Anaurosis .....	4	1	1	1	1	1	1	1	1	1	6
		Cataracta .....	1	1	1	1	1	1	1	1	1	1	1
		Conjunctivitis .....	38	1	11	5	8	3	3	2	2	2	71
		Fistula lachrymalis .....	1	1	1	1	1	1	1	1	1	1	3
		Hemeralopia .....	4	1	4	1	1	1	1	1	1	1	4
		Iritis .....	4	7	1	1	1	1	1	1	1	1	12
		Ophthalmia .....	7	1	2	1	4	1	1	1	1	1	13
		Pterygium .....	1	1	1	1	1	1	1	1	1	1	3
		Retinitis .....	1	1	1	1	1	1	1	1	1	1	3
		Ulcus cornes .....	1	1	1	1	1	1	1	1	1	1	1
		Hordeolum .....	1	1	1	1	1	1	1	1	1	1	1
		Cornetis .....	1	1	1	1	1	1	1	1	1	1	1
Order III....		<i>Diseases of the ear.</i>											
		Otalgia .....	2	1	1	1	1	1	1	1	1	1	3
		Otitis .....	7	1	2	1	6	1	1	1	1	1	14
		Oorrhoea .....	4	1	1	1	1	1	1	1	1	1	8
		Surdities .....	7	1	2	1	1	1	1	1	1	1	9



## Order VII.

<i>Pneumonia chronica</i> .....	13	1	1	5	2	7	3	2	3	1	31	2
<i>Pleuritis</i> .....	21	1	3	3	1	8	4	1	4	1	41	1
<i>Pneumonia</i> .....	23	2	1	1	2	2	4	1	2	2	34	5
<i>Emphysema</i> .....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....
<i>Congestion of lungs</i> .....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
<i>Hemoptysis</i> .....	.....	.....	.....	1	.....	.....	3	.....	.....	.....	5	.....
<i>Diseases of the digestive system.</i>												
<i>Ascites</i> .....	.....	1	1	.....	.....	.....	.....	.....	.....	.....	1	1
<i>Cholera morbus</i> .....	28	4	38	.....	.....	16	21	.....	.....	.....	115	.....
<i>Colica</i> .....	36	2	11	2	.....	11	30	5	2	1	90	.....
<i>Constipation</i> .....	19	6	5	.....	.....	5	5	4	.....	.....	8	.....
<i>Diarrhea acuta</i> .....	146	7	52	1	60	1	192	1	16	1	48	.....
<i>Diarrhea chronica</i> .....	15	.....	.....	.....	.....	2	13	3	1	.....	511	2
<i>Dysentery chronica</i> .....	36	12	16	3	3	3	35	11	.....	.....	31	4
<i>Dysentery chronica</i> .....	8	.....	.....	.....	.....	3	1	.....	.....	.....	120	.....
<i>Dyspepsia</i> .....	18	1	4	10	.....	3	31	3	.....	.....	14	.....
<i>Enteritis</i> .....	1	1	1	.....	.....	1	.....	.....	.....	.....	68	.....
<i>Fistula in ano</i> .....	7	1	2	3	.....	3	2	.....	.....	.....	15	.....
<i>Gastritis</i> .....	3	.....	.....	.....	.....	.....	1	.....	.....	.....	4	.....
<i>Hematemesis</i> .....	.....	.....	6	.....	.....	4	1	.....	.....	.....	5	.....
<i>Hemorrhoids</i> .....	26	6	1	1	.....	1	10	3	.....	.....	11	.....
<i>Hepatitis acuta</i> .....	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	47	.....
<i>Hepatitis chronica</i> .....	6	1	2	.....	.....	2	1	.....	.....	.....	4	.....
<i>Icterus</i> .....	.....	.....	.....	.....	.....	5	3	.....	.....	.....	6	.....
<i>Peritonitis</i> .....	8	1	3	.....	.....	1	.....	.....	.....	.....	19	1
<i>Pharyngitis</i> .....	.....	.....	.....	.....	.....	2	.....	.....	.....	.....	1	.....
<i>Prolapsus ani</i> .....	.....	.....	.....	.....	.....	2	.....	.....	.....	.....	23	.....
<i>Splenitis</i> .....	2	.....	.....	.....	.....	1	.....	.....	.....	.....	1	.....
<i>Stomatitis</i> .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....
<i>Tonsillitis</i> .....	81	7	16	27	.....	27	34	12	.....	.....	184	.....
<i>Parotitis</i> .....	3	1	.....	.....	.....	.....	.....	.....	.....	.....	4	.....
<i>Pyrosis</i> .....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	1	.....
<i>Diseases of the urinary and genital system.</i>												
<i>Albuminuria</i> .....	.....	.....	1	1	.....	1	.....	.....	.....	.....	2	1
<i>Calculus</i> .....	.....	.....	.....	.....	.....	.....	2	.....	.....	.....	2	.....
<i>Cystitis</i> .....	2	1	1	7	.....	7	3	.....	.....	.....	13	.....
<i>Diabetes</i> .....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
<i>Dysuria</i> .....	2	.....	.....	1	.....	1	3	.....	.....	.....	6	.....
<i>Ischuria</i> .....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
<i>Nephritis</i> .....	1	.....	.....	.....	.....	.....	1	.....	.....	.....	1	.....
<i>Orchitis</i> .....	43	2	14	9	.....	9	42	1	.....	.....	115	.....
<i>Paraphimosis</i> .....	.....	.....	.....	2	.....	2	.....	.....	.....	.....	2	.....
<i>Phymosis</i> .....	3	.....	3	.....	.....	2	.....	.....	.....	.....	8	.....

## Order VIII.



	7	4	2	6	6	6	25
Class V ...							
NON-MALIGNANT TUMORS AND CYSTS.							
Adenoma.....	2				1		3
Cystis sebacea.....	2						2
Lipoma.....	1						1
Epithelioma.....	1						1
Class VI ...							
Order I....							
VIOLENT DISEASES AND DEATHS.							
Wounds, injuries, and accidents.							
Abrasio.....	33	5	15	24	9	2	90
Ambustio.....	43	3	15	3	16	1	82
Concussio cerebri.....	2				1		5
Contusio.....	175	21	86	75	108	2	492
Explosio.....	2		4			8	6
Fractura.....	25	2	5	9	5		44
Hernia.....	30	1	5	3	2	2	43
Luxatio.....	17	1	2	6	3		32
Strumma.....	92	16	29	30	28	12	217
Submersio.....	2	2		2	1		8
Venenatio.....	3	1			1		1
Vulnus contusum.....	81	8	13	27	39	27	205
Vulnus incisum.....	3						143
Vulnus laceratum.....	68	5	24	23	17	5	81
Vulnus punctum.....	37	1	14	14	9	2	72
Vulnus sclopetarium.....	31	3	9	14	12	3	7
Vulnus venenatum.....	4		1				2
Concussio spinalis.....	2				2		2
Total.....	3,151	11	924	7	1,144	6	7,797

(Compiled from reports on file in the Bureau of Medicine and Surgery.—J. B. P.)

Station	{ North Atlantic.  South Atlantic.	European.		Pacific.		Asiatic.		Special service.		School Coast Sur- vey.	Total.
		(Cases treated.)	Deaths.	(Cases treated.)	Deaths.	(Cases treated.)	Deaths.	(Cases treated.)	Deaths.	(Cases treated.)	
Aggregate number of men.....	1,764.	939.	1,089.	830.	1,447.	348.	1,014.	30.			7,461.
Disease.											
ZYMOTIC DISEASES.											
Miasmatic disease.											
Catarrhus epidemicus	8		1			3	2				11
Cholera communis			23			6					7
Cynanche parotidea											25
Dengue				1							1
Diphtheria				1							1
Erysipelas	1	4	2	2		1					1
Febris continua simplex	6	16	45	3		9					11
Febris enterica	3		1	1		2					96
Febris flava											7
Febris intermittens	105	42	39	78		126					3
Febris recidiva			1			32					400
Febris remittens	26	3	7	80		23					3
Morbilli	6										139
Rubeola											6
Scarlatina	1										3
Varicella	1										1
Varicella			2								2
Varioloides											2
Febris typhosa	7					2					2
Febris typhoïdes	2										2
Vaccinæ			6								11



Order II.	Enthetic diseases.	49	24	30	23	63	11	7	207
	Syphilis primitiva	24	18	12	54	3	6	3	135
	Syphilis consecutiva	24	18	12	54	3	6	3	135
	Gonorrhoea	43	14	21	35	49	8	10	181
	Ophthalmia gonorrhoeica					1			1
	Balanitis			1					1
	Bubo			1					1
	Verruca						1		1
Order III.	Dietic diseases.								
	Alcoholismus	10	9	14	54	12	6	4	109
	Delirium tremens	4	1	3	1	6	1	1	17
	Ebrietas		1	1		13	1		16
CLASS II.	CONSTITUTIONAL DISEASES.								
Order I.	Diathectic diseases.								
	Adynamia	19	6	21	10	33	7	7	103
	Anemia	1	1		1	4		2	8
	Gangrena scillitis		1						1
	Hydrops						1		1
	Podagra		4						6
	Rheumatismus acutus	40	19	22	29	85	12	17	226
	Rheumatismus chronicus	24	15	23	41	46		8	139
	Rheumatismus musculorum		1						1
	Anasarca	1		1		1			1
	Debilitas	1			1				1
Order II.	Developmental diseases.								
	Degeneratio		1		1				1
	Senectus				1				2
Order III.	Tubercular diseases.								
	Tuberculosis	2							2
CLASS III.	PARASITIC DISEASES.								
	Scabies		1			3			4
	Vermes	1	1			1			5
	Filaria medinensis	1		2					1



<i>Order II...</i>	<i>Enthetic diseases.</i>											
	Syphilis primitiva.....	49	24	30	23	63	11	7	207			
	Syphilis consecutiva.....	24	18	18	12	54	6	3	135			
	Gonorrhoea.....	43	14	21	35	49	8	10	181			
	Ophthalmia gonorrhoeica.....					1	1		1			
	Balanitis.....			1					1			
	Bubo.....			1					1			
<i>Order III.</i>	<i>Dietic diseases.</i>											
	Alcoholismus.....	10	9	14	54	12	6	4	109			
	Delirium tremens.....	4	1	3	1	6	1	1	17			
<i>Class II.</i>	Ebrietas.....		1	1		13	1		16			
	CONSTITUTIONAL DISEASES.											
<i>Order I....</i>	<i>Diathetic diseases.</i>											
	Adynamia.....	19	6	21	10	33	7	7	103			
	Anæmia.....	1			1	4		2	8			
	Gangrena scillis.....		1						1			
	Hydrops.....						1		1			
	Podagra.....		4						2			
	Rheumatismus acutus.....	40	19	22	29	85	12	17	226			
	Rheumatismus chronicus.....	24	15	23	41	46		8	159			
	Rheumatismus musculorum.....		1						2			
	Anasarca.....	1							1			
	Debilitas.....	1							1			
<i>Order II...</i>	<i>Developmental diseases.</i>											
	Degeneratio.....				1				1			
	Senectus.....		1		1				2			
<i>Order III.</i>	<i>Tubercular diseases.</i>											
	Tuberculosis.....	2							2			
<i>Class III.</i>	PARASITIC DISEASES.											
	Scabies.....		1			3			4			
	Vermes.....	1	1	2		1			5			
	Filaria medinensis.....	1							1			

Summary of prevalent forms of disease on home and foreign service for the year ending December 31, 1877—Continued.

Station	{		South Atlantic.	European.	Pacific.	Asiatic.	Special service.		School and Coast Survey.	Total.
	North Atlantic.						Cases treated.	Deaths.	Cases treated.	Deaths.
Aggregate number of men	1,764.		939.	1,089.	830.	1,447.	348.	1,014.	30.	7,641.
Order and class.	Disease.	Cases treated.	Deaths.	Cases treated.	Deaths.	Cases treated.	Deaths.	Cases treated.	Deaths.	Cases treated.
CLASS IV.	LOCAL DISEASES.									
Order I.	Diseases of the nervous system.									
	Apoplexia		1							4
	Cephalalgia	6	4	20	1	3	8	11		64
	Sciatica	1				14		3		4
	Dementia			1	2	1	1	1		4
	Epilepsia	6	8	1	4	4	1	4		28
	Insolatio	7	1			11				19
	Irritatio spinalis		1		1				1	3
	Mania				2	1		3		3
	Melancholia	1	1		1			1		6
	Meningitis							1		1
	Myelitis	1								1
	Neuralgia	23	9	50	28	34	9	7		160
	Paralysis		2	1				2		5
	Myalgia		2							2
	Lumbago					1		1		2
	Vertigo					2				2
	Torticollis					2				2
	Aphasia			1						1
	Insanity			1						1
Order II.	Diseases of the eye.									
	Amaurosis									
	Cataracta			1				3		4
	Conjunctivitis	13	8	12	3	25	1	4		66
	Fistula lachrymalis				1					1



Summary of prevalent forms of disease on home and foreign service for the year ending December 31, 1877—Continued.

Station	North Atlantic.	South Atlantic.	European.	Pacific.	Asiatic.	Special service.	School and Coast Sur- practice.	Coast Sur- vey.	Total.
Aggregate number of men	1,764.	839.	1,089.	890.	1,447.	348.	1,014.	30.	7,641.
Order and class.	Deaths.	Deaths.	Deaths.	Deaths.	Deaths.	Deaths.	Deaths.	Deaths.	Deaths.
Order VI.	Deaths.	Deaths.	Deaths.	Deaths.	Deaths.	Deaths.	Deaths.	Deaths.	Deaths.
CLASS IV.									
LOCAL DISEASES—Continued.									
Diseases of the respiratory system—Continued.									
Pneumonia	5	4	4	2	7	2	3		26
Hemoptysis			1		6	1			7
Emphysema					1	1			2
Order VII.									
Diseases of the digestive system.									
Cholera morbus	12	2	23	11	35	3	3		80
Cirrhosis hepatis	2								2
Colica	12	6	16	17	37	5	2		95
Constipation	5	2	2	3	15	2			31
Diarrhoea acuta	45	17	62	43	130	20	28	1	347
Diarrhoea chronica	6	1	1	3	5	1	1		17
Dysenteria acuta	32	20	3	1	22	5	3		86
Dysenteria chronica	4				3				8
Dyspepsia	3	3	11	4	12	2	4		39
Enteritis	1					1			1
Fistula in ano		1	1		3	1			5
Gastritis	6			9	3	1	1		19
Hæmatemesis									
Hæmorrhoids	14	11	9	7	11	1	2		55
Hepatitis acuta	5	1		1	2				9
Hepatitis chronica	2	1				1			3
Icterus	5	1	4	5					16
Peritonitis		1	2						3
Pharyngitis	2	1	5	6	3	7	8	1	23
Prothapsus ani	2				1				3

[illegible]





[illegible]

*Summary of prevalent forms of disease on home and foreign service for the year ending December 31, 1878.*

[Compiled from reports on file in the Bureau of Medicine and Surgery.—J. B. P.]

Station	{		North Atlantic.	South Atlantic.	European.	Pacific.	Asiatic.	Special service.	School and Coast Sur- vey.	Total.
Aggregate number of men	2,214.	581.	1,036.	1,419.	1,314.	959.	208.	75.	7,806.	
Order and class.	{		Deaths.	Cases treated.	Deaths.	Cases treated.	Deaths.	Cases treated.	Deaths.	Cases treated.
CLASS I....	{									
Order I....	{		ZYMOTIC DISEASES.							
Miasmatic diseases.										
Cholera epidemica.										
Cynanche parotidea.	1						6	2		6
Dysentery.	1									1
Erysipelas.	1									1
Febris continua simplex.	26	8	4	9	18	3	1			10
Febris enterica.	3	13	1	3	5	1		1		91
Febris flava.	24	8	1	1	1					13
Febris intermittens.	125	22	49	136	104	134	40	2		40
Febris recidiva.	2	1	2	1	4	5	1			9
Febris remittens.	18	1	13	33	1	1	3	1		612
Febris typhus.		24	2	1						6
Morbilli.			2							100
Pyæmia.										7
Vaccinia.			1	1						1
Varicella.	1		1							2
Variola.	1		2							1
Febris chagras.	2									3
Enthetic diseases.										
Gonorrhœa.	36	3	33	20	40	34	17	2		204
Ophthalmia gonorrhœica.			1	1		1				3
Syphilis primitiva.	63	23	41	22	29	34	7			310
Syphilis consecutiva.	34	7	20	13	39	4	5			122

Order III. CLASS II. HY	<i>Dietic diseases.</i>														
	Alcoholismus.....	25	6	1	10	14	12	1	20	7	.....	.....	.....	100	2
	Delirium tremens.....	4	.....	.....	1	1	5	.....	6	1	.....	.....	.....	18	.....
	Ebrietas.....	1	.....	8	.....	1	6	.....	1	.....	.....	.....	.....	12	.....
	Narcosis (use of opium). (CONSTITUTIONAL DISEASES.	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
	<i>Diathetic diseases.</i>														
	Adynamia.....	12	12	.....	26	1	23	.....	19	4	.....	.....	.....	111	1
	Anæmia.....	.....	.....	.....	2	.....	1	.....	3	1	.....	.....	.....	14	.....
	Hydrops.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
	Podagra.....	2	9	.....	1	.....	1	.....	.....	.....	.....	.....	.....	13	.....
Order II.	Rheumatismus acutus.....	34	1	7	.....	8	44	.....	20	10	.....	.....	.....	156	1
	Rheumatismus chronicus.....	28	17	.....	32	40	50	.....	19	21	.....	.....	.....	207	.....
	Lumbago.....	.....	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	.....
	Pleurodynia.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
	<i>Developmental diseases.</i>														
	Degeneratio.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	1	.....
	Senectus.....	.....	.....	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	2	.....
	<i>Tubercular diseases.</i>														
	Scrofula.....	2	.....	.....	.....	.....	.....	.....	1	1	.....	.....	.....	4	.....
CLASS III.	<i>PARASITIC DISEASES.</i>														
	Scabies.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	.....
	Vermes.....	1	.....	.....	4	.....	.....	.....	4	1	.....	.....	.....	11	.....
CLASS IV. Order I.	<i>LOCAL DISEASES.</i>														
	<i>Diseases of the nervous system.</i>														
	Cephalalgia.....	10	.....	13	.....	15	13	.....	9	.....	.....	.....	.....	59	.....
	Cerebritis.....	1	.....	.....	1	.....	1	.....	1	.....	.....	.....	.....	3	.....
	Chorea.....	.....	.....	.....	1	.....	.....	.....	1	.....	.....	.....	.....	1	.....
	Dementia.....	4	.....	.....	.....	1	4	.....	.....	.....	.....	.....	.....	10	.....
	Epilepsia.....	.....	1	.....	3	4	6	.....	10	7	.....	.....	.....	37	.....
	Insolatio.....	3	.....	.....	.....	1	6	.....	.....	.....	.....	.....	.....	10	.....
	Irritatio spinalis.....	1	.....	.....	.....	1	1	.....	.....	.....	.....	.....	.....	3	.....
	Mania.....	.....	.....	.....	2	2	2	.....	3	1	.....	.....	.....	6	.....
	Meancholia.....	2	.....	.....	3	.....	.....	.....	.....	.....	.....	.....	.....	11	.....
	Myelitis.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	1	.....
	Nausea marinis.....	.....	2	.....	40	.....	1	.....	.....	.....	.....	.....	.....	2	.....
	Neuralgia.....	19	.....	.....	.....	27	26	.....	9	5	.....	.....	.....	128	.....



Otorrhoea.....	1	.....	1	.....	5	.....	1	.....	2	.....	12	.....
Surditas.....	.....	.....	.....	.....	2	.....	.....	.....	.....	.....	2	.....
<i>Diseases of the nose.</i>	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ozena.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1	.....
Obstruction of lachrymal ducts.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1	.....
<i>Diseases of the teeth.</i>	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Odontalgia.....	14	.....	.....	.....	1	.....	.....	.....	9	.....	24	.....
<i>Diseases of the circulatory system.</i>	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Angina pectoris.....	.....	.....	.....	.....	6	.....	.....	.....	.....	.....	7	.....
Hypertrophie cordis.....	1	.....	2	.....	.....	.....	.....	.....	5	.....	9	.....
Morbi valvularum cordis.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	7	.....
Palpitatio.....	2	1	4	.....	7	.....	.....	.....	2	.....	22	.....
Pericarditis.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1	.....
Varix.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....
<i>Diseases of the respiratory system.</i>	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Apnoea.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
Asthma.....	7	.....	10	.....	3	.....	.....	.....	.....	.....	26	.....
Bronchitis acuta.....	30	20	50	.....	36	.....	.....	.....	45	.....	243	.....
Bronchitis chronica.....	9	2	.....	.....	5	.....	.....	.....	9	.....	38	.....
Catarrhus.....	42	.....	54	.....	28	.....	.....	.....	79	.....	276	.....
Epistaxis.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
Hemoptysis.....	1	.....	8	.....	.....	.....	.....	.....	1	.....	15	.....
Laryngitis.....	.....	.....	.....	.....	1	.....	.....	.....	6	.....	16	.....
Phthisis pneumonica acuta.....	1	.....	5	.....	1	.....	.....	.....	2	.....	12	.....
Phthisis pneumonica chronica.....	4	.....	3	.....	9	.....	.....	.....	1	.....	41	.....
Pleuritis.....	6	10	4	.....	5	.....	.....	.....	12	.....	41	.....
Pneumonia.....	5	1	8	.....	1	.....	.....	.....	14	.....	48	.....
<i>Diseases of the digestive system.</i>	.....	.....	.....	.....	.....	.....	.....	.....	13	.....	41	.....
Ascites.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
Cholera morbus.....	4	.....	.....	.....	9	.....	.....	.....	5	.....	40	.....
Cirrhosis hepatis.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
Colica.....	11	2	9	.....	8	.....	.....	.....	16	.....	79	.....
Congestio hepatis.....	.....	.....	.....	.....	1	.....	.....	.....	4	.....	1	.....
Constipatio.....	4	.....	9	.....	5	.....	.....	.....	9	.....	34	.....
Diarrhoea acuta.....	61	6	43	.....	43	.....	.....	.....	66	.....	549	.....
Diarrhoea chronica.....	.....	.....	.....	.....	.....	.....	.....	.....	24	.....	18	.....
Dysenteria acuta.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	67	.....
Dysenteria chronica.....	12	5	8	.....	5	.....	.....	.....	9	.....	1	.....

Summary of prevalent forms of disease on home and foreign service for the year ending December 31, 1878—Continued.

Station	North Atlantic.	South Atlantic.	European.	Pacific.	Asiatic.	Special service.	School and Coast Survey.	Total.
Aggregate number of men	2,214.	581.	1,036.	1,419.	1,314.	956.	208.	7,906.
Order and class.	Disease.	Cases treated.	Deaths.	Cases treated.	Deaths.	Cases treated.	Deaths.	Cases treated.
CLASS IV.	LOCAL DISEASES—Continued.							
Order VII.	Diseases of the digestive system—Continued.							
	Dyspepsia	5	1	10	13	14	1	55
	Enteritis	1		2	3	1	1	1
	Fistula in ano	1	3	3	2		1	10
	Gastritis	2	3		1			9
	Gastrodynia							6
	Hematemesis	11	1	5	14	2		2
	Hemorrhoids	1	1	3		3	1	9
	Hepatitis acuta		3	1				42
	Hepatitis chronica	2	1	6		1	1	1
	Ischuria	1		1				24
	Pharyngitis	1	1	15	1	10	2	32
	Proctopus ani					1		2
	Splenitis	1	1					1
	Stomatitis	30	6	14	11	30	1	135
	Tonsillitis	1						6
	Perityphlitis		1					1
	Volvulus			1				1
	Nausea							1
Order VIII	Diseases of the urinary and genital system.							
	Albuminuria	2		1	1	1		4
	Balanitis							1
	Gonorrhea		1					1
	Cystitis	3	1	5	11	3	1	23

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Summary of prevalent forms of disease on home and foreign service for the year ending December 31, 1878—Continued.

Station	{										Total
	North Atlantic.	South Atlantic.	European.	Pacific.	Asiatic.	Special service.	School and practice.	Coast Survey.	Deaths.	Cases treated.	
Aggregate number of men	2,214.	581.	1,036.	1,419.	1,314.	950.	208.	75.			7,806.
Order and class.	Disease.										Deaths.
	Cases treated.	Cases treated.	Cases treated.	Cases treated.	Cases treated.	Cases treated.	Cases treated.	Cases treated.	Cases treated.	Cases treated.	
CLASS IV ..	LOCAL DISEASES—Continued.										
Order VII.	Diseases of the digestive system—Continued.										
Dyspepsia	5	1	11	10	13	14	1				55
Enteritis							1				1
Fistula in ano	1		2	2	3	1	1				10
Gastritis	2	1	3	3	1						9
Gastrodynia											6
Hæmatæmia		1	6	1	14	2	3				22
Hæmorrhoids	11	1	1	3		3	1				42
Hepatitis acuta	1	1									2
Hepatitis chronica	1	1									2
Loærus	2	3	10	6	1	2	1				24
Pharyngitis	1		1	15	1	10	2				32
Prolapus ani	1		1			1					2
Splenitis		1									1
Stomatitis	1		1	1			2				5
Tonsillitis	30	6	25	14	11	30	18	1			135
Perityphilitis		1									1
Volvulus		1	1								1
Nausea				1							1
Order VIII.	Diseases of the urinary and genital system.										
Albuminuria	2			1	1						4
Balanitis						1					1
Calculus							1				1
Cystitis	2	1	1	5	11	2					22



Dysuria.....	1	1	2	1	2	1	1	1	1	3
Emurea .....	1	1	1	1	1	1	1	1	1	11
Fistula vesicæ.....	1	1	1	1	1	1	1	1	1	3
Hæmaturia.....	1	1	1	1	1	1	1	1	1	3
Hydrocele.....	1	1	1	1	1	1	1	1	1	7
Ischuria.....	3	1	1	1	1	1	1	1	1	7
Nephritis.....	20	8	13	35	18	3	3	3	3	123
Proctitis.....	1	3	1	1	1	1	1	1	1	5
Paraphimosis.....	1	1	1	1	1	1	1	1	1	3
Phymosis.....	3	1	2	1	1	1	1	1	1	8
Spermatorrhœa.....	2	3	3	11	8	1	1	1	1	34
Urethraë strictura.....	2	3	3	11	8	1	1	1	1	5
Variocoele.....	1	1	1	2	1	1	1	1	1	4
Diabetes.....	1	1	1	2	1	1	1	1	1	1
<i>Diseases of the locomotive system.</i>										
Arthritis.....	1	1	1	1	4	1	1	1	1	7
Ankylosis.....	1	1	1	1	1	1	1	1	1	4
Coxalgia.....	1	1	1	2	1	1	1	1	1	3
Hydrops articulo-rum.....	1	1	1	1	1	1	1	1	1	1
Necrosis.....	2	1	1	1	1	1	1	1	1	2
Periostitis.....	1	1	1	1	1	1	1	1	1	2
Synovitis.....	2	2	10	4	6	6	6	6	6	24
Thectitis.....	1	1	1	1	1	1	1	1	1	1
<i>Diseases of the integumentary system.</i>										
Abscessus.....	26	6	34	34	43	18	18	18	18	174
Acne.....	1	1	1	1	1	1	1	1	1	2
Adenitis.....	13	5	11	30	15	5	5	5	5	97
Anthrax.....	4	1	4	7	3	2	2	2	2	21
Ecthyma.....	1	1	1	2	3	1	1	1	1	3
Eczema.....	1	1	1	2	4	4	4	4	4	12
Erythema.....	1	1	1	2	1	1	1	1	1	4
Furunculus.....	23	6	38	54	26	14	14	14	14	224
Herpes.....	1	1	5	3	3	2	2	2	2	16
Impetigo.....	1	1	1	3	1	1	1	1	1	5
Lichen.....	1	1	1	3	1	1	1	1	1	5
Onychia.....	1	1	1	3	1	1	1	1	1	5
Paronychia.....	6	5	5	6	6	5	5	5	5	43
Pernio.....	1	1	1	1	6	1	1	1	1	9
Prurigo.....	1	1	1	2	6	1	1	1	1	1
Psoriasis.....	1	1	1	2	1	1	1	1	1	3
				3						4

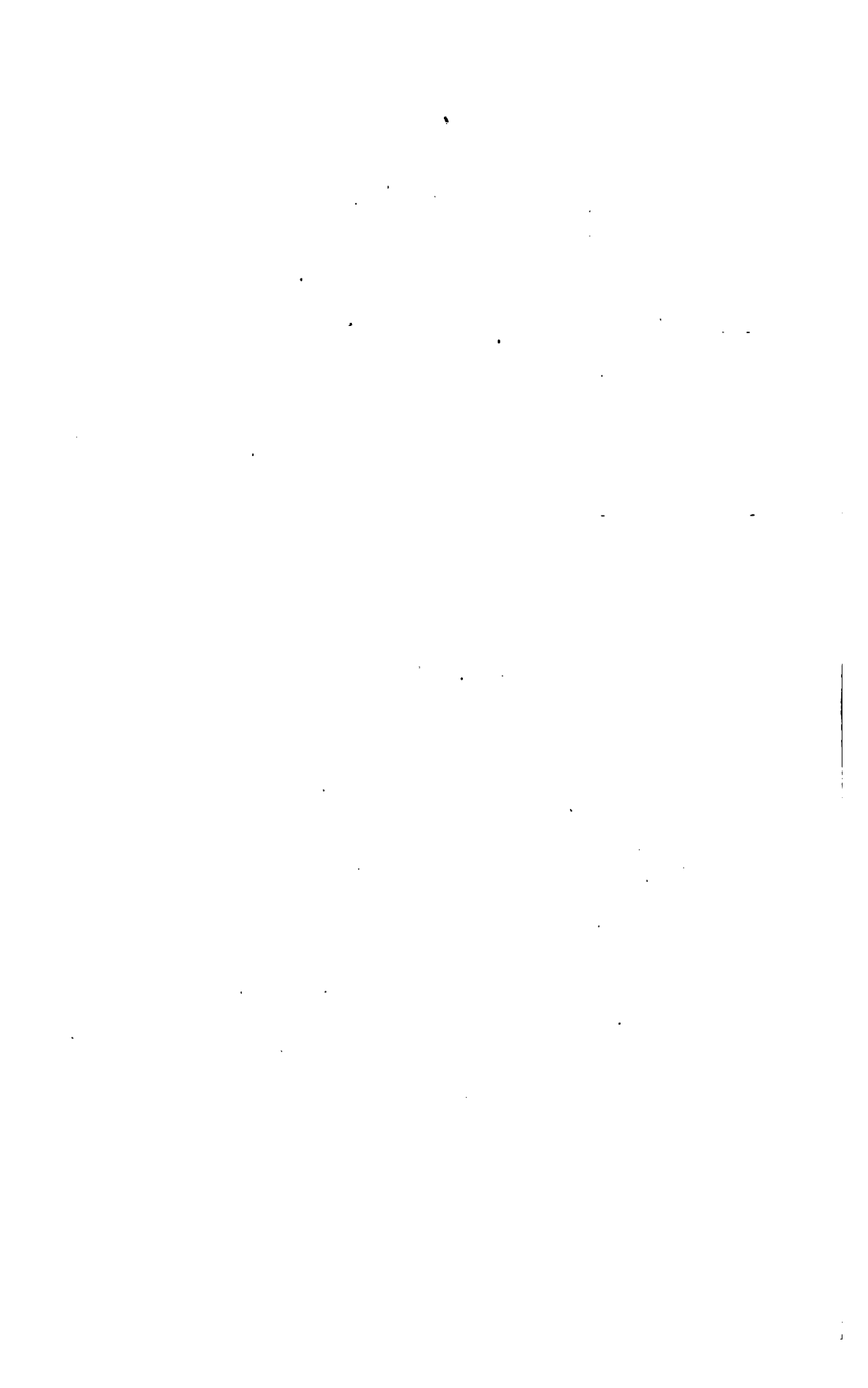
## Order IX. Diseases of the locomotive system.

## Order X. Diseases of the integumentary system.

Summary of prevalent forms of disease on home and foreign service for the year ending December 31, 1878—Continued.

Station	{		North Atlantic.	South Atlantic.	European.	Pacific.	Asiatic.	Special service.	School and practice.	Coast Survey.	Total.
Aggregate number of men			2,214.	581.	1,036.	1,419.	1,314.	959.	208.	75.	7,806.
Order and class.	Disease.										
CLASS IV .. Order VIII	LOCAL DISEASES—Continued. Diseases of the integumentary system—Continued.										
	Unguis involutis	1						1			3
	Ulcus	6		11	3		1				40
	Urticaria	1		1	1	14	6				3
	Rosacea				3						3
CLASS V ..	NON-MALIGNANT TUMORS AND CYSTS.										
	Adenoma				1						1
	Cystis			1					4		5
	Lipoma						1				1
	Tumor cerebri			1							1
	Hæmatoma				2						2
CLASS IV .. Order I....	VIOLENT DISEASES AND DEATHS. Wounds, injuries, and accidents.										
	Abrasio	5			3	2	8	13	12	2	45
	Ambustio	8			6	10	17	11	10		63
	Concusio cerebri	1				8		1			6
	Congelatio						2		1		3
	Contusio	47		18	53	59	77	66	31		351
	Fractura	11		5	6	6	16	12	2		63
	Hæmela	3		1	6	1	5	7	4		27
	Laxatio	7			6	4	4	18			39
	Strømia	41		16	27	47	40	29	27	1	233
	Submeralo	4						3			6

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## PART II.

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### MISCELLANEOUS CONTRIBUTIONS

FROM

MEDICAL OFFICERS OF THE UNITED STATES NAVY.



# AIR AND MOISTURE ON SHIPBOARD.

## A FRAGMENT OF APPLIED PHYSIOLOGY.

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MEDICAL INSPECTOR UNITED STATES NAVY.

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"Purity of the air is essential to the maintenance of health. If this proposition be not admitted, all reasoning on the matter must cease."—ACKLAND.

"Of all the atmospheric agents, it is the humidity of the air that is most dangerous to the crew."—LÉVY.

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In the report of the Bureau of Equipment and Recruiting for the year 1877, made to the honorable Secretary of the Navy, by its chief, Commodore R. W. Shufeldt, U. S. N., the importance of a more efficient ventilation of ships of war was commented upon and recommendations made toward securing a larger supply of air to the lower decks of our vessels than now obtains.

A chart exhibiting the cubic air-space for each officer and man on board of three vessels taken as the exponents of the various rates in the service was appended to this report.

In this chart the cubic air-space in vessels of the Swatara class equals 324 cubic feet for each officer, 58 cubic feet for each man, with a complement of 25 officers and 180 men; in those of the Richmond class, 273 cubic feet per officer, and 68 cubic feet per man, with a complement of 34 officers and 285 men; in vessels of the Miantonomoh rating, 1,158 cubic feet per officer

and 81 cubic feet per man, with a complement of 13 officers and 171 men.

These numbers of cubic feet per person are obtained by dividing the total cubic air-space on the lower deck by the complement of officers and men.

The object of a portion of this paper is to exhibit and demonstrate from official data, physiologically considered, the inefficiency of the present as well as the necessity that obtains for a better ventilation.

It is obvious that the number of the crew of a vessel of war is determined by the requirements of the battery and the handling of the ship, and in the instances named limited air-space or overcrowding is an unavoidable consequence.

The Revised Statutes of the United States, paragraph 4252, assigns to each passenger on a main or poop deck 16 clear superficial feet; if the decks are 6 feet in the clear, 18 clear superficial feet on lower decks; no passenger to be carried where the decks are less than 6 feet in the clear; and where the decks are  $7\frac{1}{2}$  feet or more in the clear, 14 superficial feet is the allowance.

The British merchant-shipping act assigns 72 cubic feet and 12 superficial feet on deck for each person as the minimum space. These measurements we must accept provisionally as a standard.

This unavoidable overcrowding follows its usual law in increased sick and death rates.

How soon the air on these lower decks becomes unfit for the purposes of respiration and consequently detrimental to health, will be made evident from the following facts: The normal amount of carbon-dioxide existing in the atmosphere is accepted at 4 volumes in 10,000, and the limit of respiratory impurities, as measured by the increased volume of this gas, is stated by the best authorities to be 6 volumes in 10,000. It must be stated here, with the hope that it may be distinctly understood,



that carbon-dioxide is used as the *measure* of the impurity of the air, not on account of its own special poisonous action, but because (and I quote the words of Billings) "within certain limits its quantity may be taken as the measure of that of really important impurities, and it is almost the only available test for this purpose."

The observations of Pettenkofer and Voit, Zoch, Donkin, Parkes, De Chaumont, repeated by the writer, amount to an absolute demonstration of this fact.

Now, in 50 cubic feet of *still* air this limit of impurity is attained by the respiration of a single individual in one minute of time.

It follows, therefore, that in vessels of the Swatara class, under like conditions, the limit is arrived at in 1'.16; in those of the Richmond class, in 1'.36; and in those of the Miantonomoh class, in 1'.62.

These circumstances, however, seldom or ever obtain, for in masses of men engaged in work in confined spaces, with a slow-moving air, conditions existing in a degree on shipboard, the limit of atmospheric impurity is much sooner attained, for the amount of CO<sub>2</sub> eliminated from the body by respiration alone being more than doubled in passing from a state of rest to performing work equivalent to walking one mile per hour; that is to say, a man weighing 160 pounds, *at rest*, expires per hour .716 of a cubic foot of carbon-dioxide; walking one mile per hour, 1.446 cubic feet; walking two miles per hour, 2.53 cubic feet; and should the work done be equal to walking three miles per hour, the most useful rate of work, considering the element of time, 3.275 cubic feet of carbon-dioxide is expired.

As a general rule, it may be stated that about 8 cubic inches of CO<sub>2</sub> are given off per hour for each pound avoirdupois weight of the individual when at rest.

As most of our cruising stations are within climates having

tropical characteristics, it must be stated here that the effect of increased temperature is to diminish the exhalation of  $\text{CO}_2$  from the lungs. The importance of this physiological fact will be seen presently.

The ratio of the inspired air is increased under the circumstances of work.

With these facts, the limit of atmospheric impurity in the vessels cited as examples is attained in less than one minute of time, and it follows as a consequence that on their berth-decks there is not a cubic foot of air normal in quality at any one instant from the time they are put in until the going out of commission, and this notwithstanding the law of diffusion, upon which their ventilation in a great degree depends.

In the statement first made, the amount of carbon-dioxide resulting from the combustion of fuel or from lights, &c., is excluded; that from the respiratory and cutaneous systems being alone considered.

As demonstrating the varying amounts of this gaseous impurity in the air of the vessels of the Navy, I have to call attention to the recorded observations now in the Bureau of Medicine and Surgery, whose accuracy is established over the signatures of the various medical officers observing.

Thus on the berth-deck of the Powhatan, while at Norfolk and New York, during the months of April, May, and June, the amount of carbon-dioxide ranged from 11.8 to 19.6 volumes per 10,000, the observations being made generally about 11 p. m. No registration on this vessel ever reached the normal.

On the Swatara, one of the vessels cited as an example, for the same period, at sea and in port, the range was from 15.03 to 26.62 per 10,000 volumes, and no registration ever approached the normal.

On the Ossipee the range was from 14 to 18 volumes per 10,000. The Saint Louis, Franklin, Minnesota, Alaska, Ply-

mouth, Colorado, &c., all present frequent observations, in some near and in all exceeding the limit.

The highest amount of carbon-dioxide recorded gives 39.1 volumes per 10,000, an amount exceeding those found by Rat-tray and Hayne.

Considering these recorded results in excess of the limit, as the measure of the organic impurities in the atmosphere, the remarks of Simon are not inappropriate as describing the condition of the air on the berth-decks of some of our vessels: "The foulness of the air due to the non-removal of the volatile refuse of the human body is as entirely within the physiologist's definition of filth and as truly a nuisance within the scope of sanitary law as the non-removal of solid or liquid refuse."

It seems hardly necessary to repeat that pure air is the absolute constant requirement of health and life.

Impure air and overcrowding lowers the tone of vitality, abridges life, and favors the spread of zymotic diseases. They are the parents of wasting lung-disorders and of scrofula, and give to their sickly children in the future the inheritance of unproductive labor with its accompanying poverty and crime. They shorten the life of the sailor, and they must be added to those causes suggested by Brassey and Forbes of the decline of the British and American seamen; for this skilled labor, this art and mystery of a mariner, has begun to be considered as in a decay.

The great sick-rates and consequent lessened average duration of life of these selected men of the sea are mainly dependent upon impure air, overcrowding, and humidity. Steam has demanded its tribute in these directions also, as well as the tardy footsteps of discipline in the advancement of sociology.

Of the diseases produced or aggravated by impure air the record increases steadily. All the zymotic diseases, as has been

stated, are included in the list, but more particularly are those affections of the pulmonary tissues described as wasting lung-disease or grouped as cases of phthisis pulmonalis.

It is hardly necessary to state that typhus has a synonym in ship-fever, or to recall that its origin and propagation and fatality alike are dependent upon filthy air from overcrowding.

The observations of Rattray, Muir, Blake, MacCormac, Bowditch, Welch, and others have made this evident.

Carmichael (1810) has shown the connection between impure air and scrofula; Parent du Chatelet that venereal affections are aggravated by impure air; Chadwick that impure air is a factor in producing habits of intemperance, and I have heard it stated that an eminent captain in our service has observed that most of the quarrels arising on shipboard occur in the morning watches, when the men turn out from their stuffy, air-poisoned decks, thus exhibiting the toxic effect of impure air in a lower *morale* from depressed cerebration. Air—fresh air—its necessity is the constant iteration of every sanitary observer. It is the essential of life—more necessary than food or water; a man may go days without either, but not five minutes without air.

Accepting the overcrowding and limited air-space as unavoidable, the condition of imperfect ventilation resulting therefrom has been sought to be remedied by the plan proposed in the report of a board convened by order of the honorable Secretary of the Navy, composed of Commander J. R. Bartlett, Chief Engineer D. Smith, Naval Constructor F. L. Fernald, and the writer. This report was made in May, 1878, was approved by the department, and referred to the Bureau of Construction and Steam-Engineering, respectively.

The plan proposed in this report is susceptible of alteration and adaptation to vessels of any class or size. It is simply a modified form of the Napier system of ventilation, having its

basis in the plainest application of the statics and dynamics of the air.

It answers the essential conditions called for in all ventilation—the maintenance of the air which fills the necessary cubic space allotted at such a degree of purity (*i. e.*, normal external air) as to keep it free from danger to health of those who habitually breathe it.

Thus much briefly for the air in its constitution as affecting the health of seamen.

In a much greater degree is *dryness* of the air an *essential* requirement for the health of the sailor.

The amount of  $\text{CO}_2$  being taken as the measure of aerial impurity, it has been observed by Angus Smith that its volume is increased in *moist* air. Lehmann says “the weight of carbonic acid excreted in moist air greatly exceeds that eliminated in a dry atmosphere.” It has already been observed that the effect of an increased temperature is to diminish the exhalation of  $\text{CO}_2$  from the lungs. Now, the influence of moisture is so great that at high temperatures it neutralizes the effect of such temperature in diminishing the elimination of  $\text{CO}_2$ , which under such circumstances is retained in the system. Again, as a general rule, the expired air is saturated with moisture so that when the temperature of the air comes to be the same as the temperature of the body and saturated, no exhalation of aqueous vapor from the skin and lungs is possible; and there is also retained, from that fact, within the body, the excreta from these organs. It is evident that life cannot be prolonged in such an air at a temperature between  $90^\circ$  and  $100^\circ$  Fah.

With a temperature above  $80^\circ$  air of excessive humidity is injurious, and yet in tropical climates such humidity is sought for by the constant wetting of the decks. The natural humidity of the air on decks at sea, or anywhere else, should never be supplemented by artificial means to render it saturated.

The writer is of the opinion from observations of his own that the aqueous vapor in the air is the solvent and carrier of the  $\text{CO}_2$ , as well as the vehicle for organic matter; and he is led to believe that in determining the purity of the air by  $\text{CO}_2$ , the relative humidity at the time the observation is made should always be associated. By such grouping the value of this test is much increased, and he hazards the suggestion that it is the want of such connection which has led to the few discordant results by this method of air examination.

The atmospheric observations before referred to, as well as those of the writer, abundantly confirm the fact of the excessive humidity of the air on shipboard. In these observations the relative humidity of the open air on the spar-deck has been assumed as the *unavoidable* as well as the standard of comparison with the relative humidity of the other decks.

The excess over such standard, when it occurs, may be considered as the preventable humidity. It is not an unfrequent occurrence on dry ships, and indeed it must be considered characteristic of them, to find the relative humidity on the inclosed decks less than that of the open air. It is well to remember in all these observations the physical law that the capacity of the air for moisture increases in a geometrical ratio with its temperature, and that for every  $27^\circ$  Fah. rise in temperature the capacity of the air for moisture is doubled; and also that air is dry or moist, not in proportion to the amount of water it contains, but in proportion as it is more or less removed from saturation. As examples of the relative humidity of the air on shipboard, without any relation to the other associated physical phenomena, the following are presented:

*Powhatan*.—Average for June, 1878:

	Relative humidity.
Spar-deck .....	89
Berth-deck .....	97

The spar-deck was wet twenty-eight and the berth-deck nine times in thirty days.

*Swatara*.—Average for June, 1878:

	Relative humidity.
Spar-deck.....	75
Berth-deck .....	79

The spar-deck was washed two and the berth-deck seven times in the month.

The registrations can readily be supplemented for other months and for other vessels.

Through the favor of Assistant Surgeon J. A. Tanner, jr., U. S. N., the writer has been furnished with a copy of the observations made on board the tug *Mayflower* during part of August and September of the present year, from which the following abstract is made: "The spar-deck" of this vessel "is washed down regularly every morning. The berth-deck and steerage are coated with shellac and regularly swabbed."

Deck.	Hours.					
	10 a. m.		4 p. m.		10 p. m.	
	Tempera- ture.	Relative humidity.	Tempera- ture.	Relative humidity.	Tempera- ture.	Relative humidity.
Spar.....	21	82	22	76	21	80
Berth.....	23	79	23	78	23	79

Temperature in centigrade. Relative humidity, saturation = 100.

Now, the amount of aqueous vapor given off from the lungs and skin varies in a person at *rest* and under certain conditions, but may be assumed as an average from 30 to 32 ounces per diem, or from 550 to 584 grains per hour, enough to saturate from 90 to 100 cubic feet of air; at *work*, about 68 ounces, or 1,240 grains per hour, enough to saturate 200 cubic feet of air at the normal temperature and pressure of 62° Fah., 30 inches barometer.

The number of heat units required to evaporate this amount

of water belongs to the subject of the temperature of the air and the body. These quantities, it will be perceived, are sufficient—considering the crews and their allotted air-space in the vessels cited—to saturate with watery vapor, carrying decomposing organic matter, all that space, without resort to any other means.

The excessive humidity of the air on the lower decks has its origin almost entirely in the daily water-soaking routine which exists in the service, and to which the decks are subjected.

If this routine washing, holy-stoning, wiping, clamping, scrubbing, &c., is meant for cleanliness, an obvious inference therefrom would disrate the Augean stables from their billets, as the pre-eminent examples of filth and our vessels would be promoted to that unenvied rating.

If it is not meant for cleanliness, then, in the light of modern scientific research, it is the ruthless and barbarous wielding of a potent disease-producing weapon against the lives of the unoffending and powerless.

The daily routine of vessels in service furnishes ample evidence that the decks are constantly saturated. The following copies of the routine, so far as relates to the wetting of decks, are made from original written or printed documents:

*Monday.*—Scrub off all decks with sand.

*Tuesday.*—Holy-stone all decks.

*Wednesday.*—Scrub off decks.

*Thursday.*—Scrub decks with sand ; holy-stone forward and after passage.

*Friday.*—Scrub decks without sand.

*Saturday.*—Holy-stone all decks.

*Sunday.*—Wash off all decks.

TENNESSEE.



Again:

SUMMER.

- Monday.*—Scrub decks, &c., with sand.  
*Tuesday.*—Scrub spar-deck without sand.  
*Wednesday.*—Scrub decks, &c., without sand.  
*Thursday.*—Scrub spar-deck without sand.  
*Friday.*—Scrub decks with sand.  
*Saturday.*—Holy-stone decks, &c.  
*Sunday.*—Scrub decks without sand.

WINTER.

- Monday.*—Scrub decks, &c.  
*Tuesday.*—Scrub spar-deck.  
*Wednesday.*—Scrub decks, &c.  
*Thursday.*—Scrub spar-deck.  
*Friday.*—Scrub decks, &c.  
*Saturday.*—Holy-stone decks.  
*Sunday.*—Scrub decks.

MINNESOTA.

Again:

- Monday.*—Scrub decks.  
*Tuesday.*—Scrub decks without sand.  
*Wednesday.*—Holy-stone decks.  
*Thursday.*—Scrub spar-deck without sand.  
*Friday.*—Scrub decks with sand.  
*Saturday.*—Holy-stone decks.  
*Sunday.*—Scrub decks with sand.

The above outline is given, subject to the approval of the commanding officer. [New W. Q. & Stn. bills printed.]

Or the following summaries from official papers:

Wyoming.—August: Spar-deck wet 4, berth-deck 31 times.

Ossipee.—December: Spar-deck wet every morning when not raining, berth-deck 6 times,

Enterprise.—June: Spar-deck wet 30, berth-deck 10 times.

Plymouth.—June: Spar-deck wet 26, berth-deck 6 times.

Saint Louis.—June: Spar-deck wet 30, berth-deck 4 times.

And in one first-rate during the month of June all decks are reported dry on two occasions.

There appears, therefore, a capriciousness in this matter which should not exist.

In some instances that have come to the knowledge of the writer this wetting of the decks has been delegated to the petty officers of the ship, and has been determined upon by some oracular Bunsby, whose opinions are founded upon the way they used to do in those "good old times" to which he so fondly reverts and in which he so implicitly believes.

The whole practice is a relic of those days—of the days of Paul Hoste, Benbow, Van Tromp. Indeed, the inheritance is Noachian, and it seems to be an effort of such heredity in this direction, midst others, to reproduce the exact conditions of that memorable cruise on shipboard to-day. Otherwise it is difficult at the present time, considering the progressive development of the Navy, to understand why this abomination is so strenuously upheld. It would soon cease—

Had not damned custom brazed it so

That it be proof and bulwark against sense.

For those who may desire some few data for guidance in these matters, it may be stated that a relative humidity should not vary much from 70 to 75. The average relative humidity of the air over the world, according to Levy, being 72, may be assumed as the normal. The difference between the dry and wet bulb thermometers should not be less than 3° or 4° Fah. Briggs, the best authority upon atmospheric moisture, assigns 70 as the relative humidity in our country as best consistent with health. The air over the ocean has always a greater

degree of relative humidity than over the land, and varies slightly in summer and winter. The range has been determined as from 70 to 75, saturation=100.

The less also the cubic air-space per man, the greater becomes the relative humidity of the air.

The diurnal and seasonal variation and range of relative humidity seems positive from the observations before alluded to, but whether it follows the cyclical oscillations of the barometer and thermometer, as might be supposed, has not yet been determined. Future registrations may develop the law governing its periodicity.

It may be well here to allude to the point of comfort of the external temperature. This varies, but the range assigned by numerous observers is from 58° to 68° Fah.

All writers on etiology are agreed upon the disease-engendering effects of humidity of the air.

In 1792, Clark, in writing upon the diseases of long voyages, remarks: "The diseases occasioned at sea by heat united with moisture are fevers and fluxes"; and when treating of the means of obviating the ill effects of heat, coldness, and moisture, says, in the conclusion of his article, "to dry up all moisture by placing stoves in various parts between decks."

Welch, assistant professor of pathology at Netley, in the Alexander prize-essay says: "The main deleterious property of the general atmosphere is moisture." Again, speaking of the excess of watery vapor in the air: "According as it approaches saturation it (*i. e.*, the air) tends to impede the exhalation from the lungs and favors congestion. Beyond this, also, the intimate connection between organic matter and hygrometric bodies must not be forgotten."

Simon, speaking of filth ferments, states that "they show no power of diffusion in dry air, but, as moisture is their normal

medium, currents of humid air can doubtless lift them in their full effectiveness."

C. B. Fox remarks in his late book (1878) as follows: "Aqueous vapor possesses a powerful affinity for organic matter, and serves both to preserve and diffuse it." Again: "An excess of aqueous vapor has not only a depressing effect upon the nervous system, but it interferes with the pulmonary and cutaneous exhalations."

"Humidity," says Pringle, "is one of the most frequent causes of the derangement of health."

Fonssagrives, the authority on naval hygiene, asserts that "a damp ship is an unhealthy ship." The researches of Rouppe, Kerauden, Raoul, Bourel-Ronciere, and others, all tend to exhibit the disease-producing influence of this aerial condition.

Wagner, in his *Manual of General Pathology*, thus alludes to the moisture of the air: "Warm and damp air most impedes the radiation of heat from the body through the skin and lungs, causes exhaustion of the muscular and nervous systems, restrains respiration, diminishes the appetite, impairs the digestion, and increases the perspiration."

Sir Alexander Armstrong, the present head of the medical department of the English navy, says: "There can be no more fertile source of disease among seamen, or indeed other persons, than the constant inhalation of a moist atmosphere, whether sleeping or waking; but particularly is this influence injurious when the moisture exists between the ship's decks, where it may be at the same time more or less impure, and hot or cold according to circumstances."

It is hardly deemed necessary here to exhibit the influence of humidity in the production of the miasmata.

As to its bearing the relation of causation to wasting lung disease or phthisis and scrofula, Alison, Baudelocque, Ransome, MacCormac, Carmichael, Bowditch, Buchanan, and others, all

bear testimony to vitiated and moist air as being the most important factor in their production.

It may be well to observe here that most of the cases of phthisis in our service, whose hospital tickets are so frequently indorsed as not originating in the line of duty, have, considering the care taken in recruiting, their origin directly in the line of duty, from breathing impure, damp air. Trotter remarks in his *Medicina Nautica*: "The nature of cleanliness is often misunderstood, and I know of nothing of that kind which is so much mistaken as the too frequent and indiscreet drenching the decks, and more especially those where people sleep, with water. By this means I have known dreadful sickness *introduced*, and I have known it removed by a contrary practice. It would be deemed extravagant to advance an opinion that the decks should *never* be washed, but I feel no reluctance in making a direct assertion that it were far better that they should not be *washed at all* than with that want of discretion and precaution which so generally prevails. It has caused the deaths of thousands."

Guy, W. A., speaking of vessels like the *Centurion* and others of that date, describes them as "damp, filthy, and ill ventilated," and the history of the cruise of the *Centurion* reads to-day like a romance. "In nine months her crew of 506 was reduced to 214," &c., from cold, damp, and scurvy. The health histories, however, of such vessels as the *St. Jean d'Acre*, *Neptune*, *Caledonian*, *London*, *Renown*, *Black Prince*, and others in the English navy, and of some of our own, reveal the extent of this nuisance in deteriorating the health of the crews.

Amidst the diseases induced and aggravated by excessive humidity centrally stand those of the pulmonary organs, with phthisis and other wasting diseases of these tissues, and around them scurvy, rheumatism and its associated cardiac trouble, abscesses, felons, boils, and diseases of the subcutaneous cellular system are grouped.

Statistics confirm these statements. Thus, on the home and foreign stations for the year :

1872.—Total number of men, 11,570 ; total cases treated, 9,207 ; deaths, 61.

	Cases treated.	Deaths.
Respiratory system.....	1,020	12
Integumentary system.....	1,092	1

1873.—Total number of men, 12,723 ; total cases treated, 8,837 ; deaths, 55.

	Cases treated.	Deaths.
Respiratory system.....	896	10
Integumentary system.....	1,023	0

1874.—Total number of men, 13,870 ; total cases treated, 9,995 ; deaths, 64.

	Cases treated.	Deaths.
Respiratory system.....	1,029	12
Integumentary system.....	1,068	0

1875.—Total number of men, 10,141 ; total cases treated, 7,832 ; deaths, 49.

	Cases treated.	Deaths.
Respiratory system.....	718	11
Integumentary system.....	828	0

1876.—Total number of men, 11,138 ; total cases treated, 7,797 ; deaths, 41.

	Cases treated.	Deaths.
Respiratory system.....	558	9
Integumentary system.....	914	2

It is of importance to remember that the crews of vessels of war are examined as to their physical qualifications, and that these sick and death rates represent such rates of chosen and-picked lives.

Contrast on the other hand the records of dry ships, few in number, for this evil of dampness is widespread in all navies, and mark the evident result of the inspection.

Collingwood's flag-ship, with a crew of 800 men, kept the seas for more than a year and a half with never more than six on her sick-list. This low rate was secured by attention to dryness, ventilation, and a general care of the crew.

Admiral Foote diminished the large sick-lists of the Varuna,

caused by excessive wetting of the decks, by abating the nuisance.

Medical Director Maxwell's suggestions being carried out saved the crew of the Powhatan, in China, under like circumstances.

Admiral Boggs, when commanding the mail-steamer running from New York to Aspinwall, escaped malarial poisoning by keeping his cabin dry.

Sir Gilbert Blane very early suggested that cleanliness and dryness were of importance in preserving the health of seamen.

Trotter, when physician to the fleet of Lord Howe, rendered that fleet effective by his attention to dryness of the vessels, midst other sanitary measures. To use the words of Guy, "he helped to organize victory" by placing in the hands of his gallant chief the living material of the fleet in a state of first-rate efficiency.

The record of Captain Murray, R. N., of H. B. M. S. Valorous, exhibits the value of dryness on board ships beyond cavil or doubt: "That when, on his arrival in England, in 1823, after two years' service amid the icebergs of Labrador, the ship was ordered to sail immediately for the West Indies, \* \* \* he proceeded to his station with a crew of 150 men; visited almost every island in the West Indies and many of the ports in the Gulf of Mexico; and, notwithstanding the sudden transition from extreme climates, returned to England without the loss of a single man." He also adds "that every precaution was used, by lighting stoves between decks and scrubbing with hot sand, to insure the most thorough dryness. When in command of the Recruit gun-brig, which lay about nine miles from Vera Cruz, the same means preserved the health of the crew when other ships of war anchored around him lost from twenty to fifty men each; and although constant communication was maintained between the Recruit and the other vessels, and all

were exposed to the same external causes of disease, no case of sickness occurred on board the *Recruit*."

There is but one remedy for this excessive humidity of the air on the decks—dryness. As the humidity has its causation in the constant wetting, arrest the cause. Lacquer all decks below the spar-deck; keep clean; keep dry; dry everywhere below decks, from the bilges and limbers upward. Once a month would be sufficient for all such cleaning purposes as are now suggested to keep alive this abomination. To admit that there are no other means but this daily washing, scrubbing, &c., of securing cleanliness is an exhibition of ignorance and the worship of dirt.

I am well aware that an order directing such a degree of dryness and cleanliness which might be secured by lacquering the decks and other means, with the abandonment of this vestige of the Deluge, would be met with evasion and subterfuge, and that no effort would be spared to render it nugatory and valueless. The writer speaks with a quarter of a century's experience and recorded observation of the failure of various reforms devised for the better sanitary condition of ships.

It has been sought in this fragment to present a few from the many recognized facts entering into the composition of healthy homes on shore to the production of healthy homes afloat. The broad principles of sanitary science apply alike at sea and on shore—masses in limited space, impure air, humidity, &c., agents destructive to health—to reduce to their lowest possible values all the factors that produce this insanitary environment. This is the present paramount duty of every naval medical officer, who should remember, with Richardson, that "pure air, freedom from dampness, pure water, sunlight, and an equable temperature are the five fingers on the right hand of Health."

Two of the most potent of disease-producing agencies have been demonstrated and the means of relief suggested. In one



instance such relief is an accomplished fact, and for the future a better ventilation is assured. Dryness must follow. The one means of relief is a solved mechanical problem; the relief of the other is within the province of regulation. It is within bounds to state that the present sick-rates of the service can, by attention to sanitary measures, be reduced one-third, or perhaps one-fourth. By law the commanding officer is ostensibly held responsible, amidst other things too numerous to mention, for the health of the crew intrusted to his command. To hold him to such responsibility, however, presupposes a knowledge on his part of all that relates to the etiology of disease—a degree of omniscience that is paralyzing. Such supposition is a self-evident fallacy.

Naval sanitation should be a matter of regulation. A subject so materially affecting the health of the service rests upon officers of all grades and corps, but more particularly does it belong to the daily scrutiny and vigilance of the medical officer as part of the duty he owes the state, and it is alike the duty of the state to promote the sanitary interests, especially in her military establishments.

I trust to see the day when a holy-stone will be looked upon as a curiosity, and its temple, the sand-locker, banished from off the face of the deep. Then with improved sanitary surroundings will come an efficiency from better health, and arising from these a discipline more consonant with enlightenment than the semi-civilized code that now obtains.

No one is better aware than the writer how imperfect this sketch has been drawn. He has no opinion upon these matters other than those founded upon fact. He is also well aware how difficult it is to discuss separately all the meteoric phenomena of the air on account of their intimate correlation; the mere variation of a degree in the temperature, for instance, at once introducing new relations between man and the great aerial

ocean in which he "lives and moves and has his being," but he nevertheless believes that the study of such relations is useful to mankind as tending to wrest from Nature the secrets she still holds of the telluric origin of those perversions of the economy which we call disease. At the invocation of her worshippers, slowly but surely does the goddess of Health, the daughter of Æsculapius, stretch forth her beneficent hands alike to welcome and protect her wandering children—

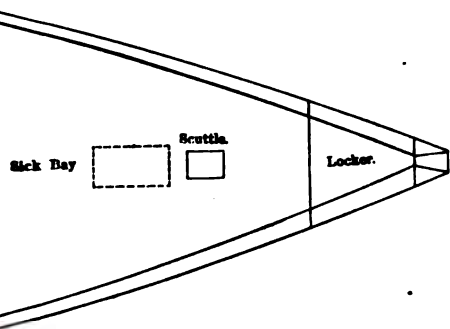
Omnibus ab oris maribusque.

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# AN ACCOUNT OF THE YELLOW FEVER ON BOARD THE U. S. S. PLYMOUTH.

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REPORT OF SURGEON THEORON WOOLVERTON.

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On the 6th October, 1878, the United States steamship Plymouth sailed from Portsmouth, N. H., under orders for Santa Cruz, on account of an insurrection in that island.

She anchored off Christianstaed on the 19th October, and on the 21st proceeded to St. Thomas, some forty miles distant, to fill up with coal; 192 tons of good anthracite coal were put on board there by natives. There had been at St. Thomas during the season some nine or ten deaths from yellow fever, of unacclimated soldiers recently arrived from Denmark, sporadic cases, and all but one occurred in the garrison. The port was considered to be healthy and was not quarantined against anywhere. During our stay at St. Thomas none of the men were allowed to land; officers were permitted to go ashore between 10 o'clock a. m. and 5 o'clock p. m.; the stewards did their marketing in the middle of the day, and but few stores of any kind were taken on board. On the 25th October the ship left St. Thomas for Frederickstaed, Santa Cruz, where she remained at anchor in an open roadstead, half a mile from shore, until the 7th November.

The island had been free from disease during the summer; there had been but one case of yellow fever, that of a soldier from St. Thomas who had taken the disease there and who died some three weeks before our arrival. The same precautions

were taken at Santa Cruz as at St. Thomas; no liberty to crew; no one on shore after sundown, and the men carefully sheltered from the frequent showers of rain. The weather was hot and humid; the mean of the noon and midnight temperatures from October 7 to November 7 was 83.2° Fah.; the maximum 87° Fah.; the minimum 79° Fah.

From the time of leaving Portsmouth there had been but two or three names on the daily sick-list, and there had been no case of fever of any kind.

On the evening of the 4th November Charles Bianchi, marine, berth-deck cook, reported that he had had a chill and was feeling badly; 5th there was decided fever, with headache and restlessness; fever continued high and on the 6th the temperature rose to 105.6; pulse, 95; stomach became irritable and in the evening he had "white vomit." The case was reported to the commanding officer as one of yellow fever.

On the evening of the 5th, it being pleasant, most of the ship's company was sent on shore for battalion drill. Two of the midshipmen, Mr. Rollins and Mr. Mallory, who had perspired freely during the exercise, after coming from shore stood a watch—Mr. R. from six to eight o'clock, Mr. M. from eight to midnight—without having changed their clothing. They both had a rigor during the night, and in the morning were sick with fever and headache. Mr. Rollins' fever was higher and his stomach symptoms more distressing than Mr. Mallory's. On the evening of the 6th Moore, marine, had a chill, followed by fever and headache. The use of the civil hospital at Fredericksstad was kindly placed at our disposal and Bianchi was transferred thither at 10 o'clock a. m., where black vomit set in in the afternoon. The midshipmen and Moore were transferred at 1.30 p. m. on the 7th, when the ship got under way for Norfolk.

On the same evening Mr. Hoffman, assistant engineer;



White, marine; and Winkler, marine, were sick with the fever; their disease ran a mild course and they were all convalescent within a week. The two marines were sent to duty November 22, well. Mr. Hoffman had an irregular pulse and violent palpitation during convalescence and did not rapidly regain his strength; he returned to duty November 30. The clothing of these patients was disinfected and their blankets thrown overboard.

After our arrival at Norfolk we learned that Mr. Rollins had died on the 10th, Bianchi on the 11th, and Mr. Mallory on the 14th November at Santa Cruz. All the clothing and other effects of these officers had gone on shore with them; the bedding of the four patients was sent with them to the hospital; the clothes of the nurses were thrown overboard.

On the 8th November the berth-deck, sick-bay, steerage, and wardroom were fumigated with sulphur, and a mixture of the sulphate of iron and of chloride of lime was poured into the bilges; all bags and hammocks were aired aloft. On the 10th the fumigation was repeated.

The ship arrived at Norfolk November 18 and was allowed pratique.

November 23, left Hampton Roads for Portsmouth, N. H., and anchored off Quarantine Island November 30. December 1, at the request of the health-officer, the berth-deck was again fumigated.

The Plymouth remained at Portsmouth until December 16, when she proceeded to Boston for some necessary repairs and to be broken and frozen out.

In a report made at Hampton Roads November 17, 1878, the following opinion was expressed: "Considering the strict sanitary rules enforced during our stay in the tropics and the slight probability that we could have carried infection from St. Thomas, from which port we had been absent ten days before

the first complaint of sickness, it is my opinion that the fever had a purely local origin, inherent in the ship, and I have no doubt but that our prompt departure from Santa Cruz averted an epidemic on board. I consider that it would be unsafe to send this ship again to warm latitudes before she has been entirely broken out and thoroughly frozen out."

Arrived at Boston December 17; the ship was broken out at the navy-yard, nothing movable being left on board in the way of stores, provisions, or clothing.

January 8, 1879, the crew was transferred to the receiving-ship Wabash, and the vessel fully exposed to the cold. Buckets of water were placed in the various store-rooms below to indicate freezing.

January 22, the ship was hauled into dry-dock and remained there until February 4; the average temperature on deck during this time was 28° Fah., but it was colder by 10° at the bottom of the dock, which was piled up with ice.

January 26, fumigated by burning fifty pounds of sulphur below decks by means of eight charcoal drying-stoves placed in various parts of ship; temperature zero; water frozen in every part of ship.

February 2, fumigated as before; fifty pounds of sulphur; temperature 11° Fah. The fumigation extended over two days with the ship closed; the berth-deck and sick-bay had been scraped before the process.

The ship came out of dry-dock February 4; she was white-washed with a mixture of lime and chloride of lime, and was believed to be thoroughly frozen out and purified. She had been overrun with ants and cockroaches; not one has been seen since the winter. The crew returned to the ship February 12; the water in the bilges froze for several nights after this, and as late as February 24 there was ice in the after bilge.

On March 15 the Plymouth sailed for a cruise to the Wind-

ward Islands. On the night of the 19th during a violent gale the hatches had to be battened down, and the damp berth-deck became very warm; a tropical condition prevailed.

On the afternoon of the 21st Richard Sanders, machinist, reported himself sick; his face was very red, and his eyes swollen and suffused; he complained of violent headache, and had considerable fever; pulse 98, temperature  $104^{\circ}$ ; fever continued high during the night; in the early morning the temperature fell to  $102^{\circ}.5$ , and it was hoped that the fever would prove to be remittent; a large dose of quinine was given. The temperature soon rose again, however, to  $104^{\circ}$ ; pulse 83 to 93; tongue lightly coated, broad, with red edges, and showing impressions of teeth. The fever continued until the 25th, when there was a remission with profuse sweating; pulse 80, soft; temperature  $102^{\circ}$  throughout the day; during the night complained of nausea, and on the 26th pulse rose to 88; temperature  $104^{\circ}.6$ , with return of headache. These symptoms subsided, and from the 27th he improved slowly but steadily. The characteristics of Sanders' fever were: The sudden and violent invasion, the intense headache with peculiar aspect of face and eyes, continued fever, remission with sweating, urine scanty and giving a precipitate of albumen, the pulse slow relatively to temperature of body; during convalescence skin and conjunctivæ became yellow and continued so for a week, and there was an irregular pulse. This man joined the Plymouth at Boston December 24, 1878.

On the night of the 22d Peter Eagan, boatswain's mate, aged about fifty-six years, turned in feeling quite well; during the night he was taken very sick, and by the morning of the 23d he could not get about without assistance. He presented the same appearance and symptoms as had Sanders, with great irritability of stomach; his case resembled remarkably one of irritant poisoning; pulse, 95; temperature,  $103^{\circ}.5$ ; skin hot and dry.

A diagnosis of yellow fever was made in these two cases and reported to Captain Harmony, with a recommendation not to continue the cruise; also, that hot coffee should be served to the relief watch at midnight, that the men be allowed to sleep on deck under cover, until we could reach cooler weather, and that they should be obliged to immediately shift any damp clothing upon occasion. The ship was headed northward latitude  $27^{\circ} 40'$  N., longitude  $59^{\circ} 59'$  W., about 330 miles southeast of the Bermudas; the maximum temperature on deck had been  $77^{\circ}$  Fah.

The ship put into Bermuda for coal, and on the night of the 25th the temperature had fallen to  $63^{\circ}$  Fah. The sick men passed through their disease pretty favorably; Sanders was convalescent about the seventh day, but Eagan, an old man, after a light remission on the fourth day fell into a typhoid condition and died from exhaustion during a violent storm, March 31; the weather had been bad and unfavorable to his recovery.

The object of the treatment was to avert stomach symptoms; the patients were kept as quiet as possible; small doses of calomel, gr.  $\frac{1}{2}$ , with Dover's powder, gr.  $\frac{1}{6}$ , were given, and small quantities of barley water, acacia water, and pounded ice allowed. In Eagan's case, Warburg's tincture was tried on three separate occasions in doses of two drachms repeated in three hours; it never failed to induce perspiration and to reduce the temperature, but the effect was transitory.

Eagan was buried April 1. April 2, Sanders was temporarily removed from the sick-bay, and it was thoroughly fumigated with sulphur and scrubbed. All the bedding that had been used for Eagan, and all clothing that might have become infected were thrown overboard. Eagan and Sanders were the sole occupants of the sick-bay, and were seen only by the medical officers and the nurses; there was no communication between them and the rest of the crew.

We reached Vineyard Sound, Mass., April 2, with a temperature of 32° Fah., and having been ordered to Portsmouth, N. H., arrived there on the 6th and were placed in strict quarantine. There were no cases of yellow fever on board after Eagan was attacked on the night of the 22d March. There was no case of fever among the men employed below the berth-deck; the machinist was taken sick in his hammock. A diagram of the birth-deck is appended, with the names of the patients and the localities of the cases marked in the order of their appearance. It will be seen that four marines were taken sick opposite the fire-room hatch, a warm place; and in March, Sanders occupied a billet corresponding to that of Bianchi, the first case in November, on the other side of the deck, while Eagan berthed near the galley, another warm spot. All the cases except Eagan's occurred between the waist of the ship and the wardroom bulk-head on the berth-deck.

The Plymouth was repaired at Boston to a considerable extent, but the inner planking and the beams and knees were in many places badly decayed, and as they did not materially weaken the ship, were not replaced by sound wood; the planking is three inches, the knees are twelve inches in thickness; the wood is particularly bad about the spot where the marines are billeted.

It is my conviction from the course of the disease that the yellow fever infection is confined to the hull of the ship, and especially to the rotten wood about the berth-deck, and that the clothing and stores on board have never been infected at all. It is conceivable that *materies morbi*, which we thought had been destroyed by cold, may have been able to exist in a dormant state in the thick porous knees or beams whose surfaces, contracted by the intense cold, may have even afforded a sort of protection—a barrier against the perfect penetration of the cold to the decayed centers.

The following reasons lead me to infer that clothing in the ship is not infected. The disease began in the person of a berth-deck cook, Bianchi, who was in the habit of cooling himself under a windsail; the midshipmen's fever was attributed to their having become overheated during an exercise, and neglecting to change their clothes. These were the exciting causes; the determining cause of yellow fever must have been present in the ship, as we had been for more than ten days away from St. Thomas before Bianchi, who had not been on shore since leaving the United States, was taken sick. All the cases were soon transferred to the hospital with their bedding and other effects, and the cases that appeared after the ship left Santa Cruz were isolated in the sick-bay, and when they convalesced, their bedding was thrown overboard and their under-clothing disinfected and washed. The men's bedding was frequently aired during the winter, and once at least, the fact is noted in the ship's log, with a temperature of 24° Fah. Many of the men availed themselves of the opportunity in Boston to have their blankets washed. The man Sanders, the first case in March, came on board for the first time at Boston during the winter; his outfit could not have been infected. Eagan was an old man-of-war's man, a particularly clean man in every respect; he swung in a part of the ship where there had been no case of fever before, near the galley. Both Sanders and Eagan were entirely isolated from the first, and their bedding was destroyed. There was no spread of fever either in November or March, an unlikely immunity if the men's bedding had become infected by contiguity.

The wet stores of the ship were exposed on the dock for five weeks; the other stores were sent to the different store-houses in the navy-yard and kept in cold rooms; but few of the provisions that had been on board were taken in again; fresh supplies were procured.

The Plymouth has always been a comfortable vessel for the men, with more than ordinary berthing room, and with sweet and accessible bilges, altogether a particularly clean ship. Our experience has, perhaps, shown that vessels that have been for a long time on the North Atlantic Station (the Plymouth has been in commission nearly four years and a half), should not be sent into a tropical climate after the appearance of any suspicious fever on board, and that besides the process of fumigation, freezing, etc., of a vessel, to render her secure against a recurrence of yellow fever, account must be taken of the condition of the wood-work. It is not shown that cold will not destroy the yellow fever infection, but only that cold did not sufficiently or entirely penetrate the spongy wood to reach it, as we believed at the time.





# REPORT

OF A

NAVAL MEDICAL BOARD TO INVESTIGATE THE CIRCUMSTANCES CONNECTED WITH THE VISITATION OF YELLOW FEVER AT NAVY-YARD, PENSACOLA, FLA.

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UNITED STATES NAVY-YARD,  
*Pensacola, Fla., January 1, 1875.*

In obedience to an order of the honorable Secretary of the Navy, dated December 12, 1874, we have carefully investigated the circumstances of the recent epidemic of yellow fever at navy-yard, Pensacola, Fla.

We have summoned and interrogated many witnesses, and listened to a great variety of statements, both of facts and opinions.

We have not confined our attention to formal evidence, but rumors and conversations have received from us such consideration as they seemed to deserve.

But for this latitudinarian character of the investigation, we should have learned but comparatively little about the matter.

From all this evidence and dogmatism, nonsense and evasions, the following statement of the origin and spread of the disease is plainly made out.

May 28, 1874, the Spanish vessel *Virtuoso* arrived from Havana with cases of yellow fever on board, and was immediately placed in quarantine.

July 18, 1874, the *Castropol* arrived from Havana with the

disease on board, and was placed in quarantine; a majority of her crew died of yellow fever, and every one, without exception, had the disease.

Other vessels, subsequently arriving without the disease, were anchored at the quarantine station without any effectual restriction against general intercourse between the infected and healthy.

A party of stevedores had permission to work on board the vessels in quarantine. They secretly visited Pensacola, Warrington, and Woolsey, principally at night, often on a spree, but chiefly to sell or trade clothes and other articles which they had purchased, begged, or stolen on board the infected ships. And thus the epidemic was introduced into the towns and the navy-yard.

May 30, 1874, a quarantine was established by resolution of city councils of Pensacola, but they were utterly powerless to prevent the stevedores circulating on shore at night, and seamen, deserters from the vessels in quarantine, moved about equally without restriction.

Some officers of the navy-yard lived in the village of Woolsey. Captain Baker, U. S. M. C., was the first attacked by the disease. The next two cases were two marines who nursed him and who lived in the barracks immediately in the rear of the house occupied by Commodore Woolsey, commandant of the station, and his family.

There is no occasion to trace individual cases further. The first case appeared August 17, 1874, and the last case occurred November 9, 1874.

The spread of the disease among the iron-clads was by equally obvious channels. The officers had permission to occupy a house on shore. Several of them lived on shore, merely visiting the ship for their turn of duty. One of the officers attached to the *Saugus* described the manner of life nearly as follows:

“When I found one of our fellows sick, I thought it would be well to move, so I gathered up my things and went aboard the Ajax. A couple of days after we had a case aboard the Ajax, and I concluded to try the woods—‘a boarding-house in the pines.’” Thus it was, and there was very little interruption to this free circulation, except when the Canonieus, not infected, left with the crews of several of the monitors for New Orleans quarantine station in time to save themselves. Subsequently there was sufficient restriction.

We know of no reliable way to disinfect the monitors Saugus and Ajax, where the disease appeared, except through freezing. Steam applied till the entire structure is raised to the temperature of boiling water, would probably be effectual; but such continued application of steam is perhaps impracticable, and, at any rate, it would so thoroughly soak the wood-work of the vessels that it never could be dried or made serviceable again. To reach by chemical disinfectants all the crannies occupied by the germs of the disease, we regard as an impossibility.

As regards the severity of the epidemic in the city of Pensacola, information is rather vague. There is positively no record of deaths, official or other. The number of deaths is variously estimated, from none at all up to our estimate, which is 354. Each physician has his record of cases treated and deaths—not generally disparaging his own skill by needlessly including in his number of cases those first seen in a comatose condition, beyond the reach of any possible treatment. The aggregate of two physicians, our very best witnesses, is 228 cases and 18 deaths. They were very busy among the better classes of people.

Among the poor, burials occurred without much ceremony, without even going to a grave-yard in some cases. Some were buried on the sand-beach, and the shifting of sand by the ebb and flow of tide exposed the naked feet of some of the dead.

An actual count by a confidential person of burials, in certain grave-yards, of persons said to have died of yellow fever, amounts to 118, and this we suppose may be about one-third of the total number; so we feel that we are safe in putting the number at more than 354, and no smaller number would account for the panic.

The city of Pensacola contains a population of 3,347. This number was reduced more than half by absentees and encampments in the woods, making one death to about five persons exposed, or 221 deaths per thousand.

During this epidemic the protection resulting from a previous attack was quite remarkable; many thus protected had the disease, but they generally recovered.

Colored people suffered comparatively little, though they did not escape.

The disease was not very severe or fatal among children; so much was this obviously the case that mothers in Pensacola voluntarily exposed their children to the infection that they might have the disease and thus enjoy immunity from it the rest of their lives. We would not recommend this course.

A number of incidents were related to us, calculated to illustrate the manner in which the germs of this disease are preserved from year to year. A family living in a healthy location, before the usual appearance of the first sporadic cases in Pensacola suddenly find their little daughter suffering from yellow fever. They cannot imagine whence the disease came, as the child and her playmates all live and spend their time away from the usually infected localities. After the child gets well enough to talk freely about the matter, it transpires that the little girl had a game of "hide and seek" in a loft containing an old sail. On investigation it turned out that the "old sail" was imported from New Orleans two years previously.

Another case, a young man about leaving Pensacola for a

cruise at sea, packed a quantity of clothing, books, etc., in a trunk and sent it for storage to friends in the country, about five miles out in the pines. Three years afterwards, on the return of this young man, his trunk was opened, its contents examined, and five persons, all that lived in the house, were attacked with yellow fever.

The following table is a summary of the disease at navy-yard and vicinity, during the epidemic under consideration:

Classes of persons.	Total population.	Colored.	Number who remained.	Number of cases.	Cases per 1,000 exposed.	Number of deaths.	Deaths per 1,000 cases.	Deaths per 1,000 exposed.
Pensacola .....	3,347		1,600	(?)	(?)	354	(?)	221
Woolsey .....	1,000		1,000	(?)	(?)	14	(?)	14
Warrington .....	1,000		1,000	(?)	(?)	13	(?)	13
Officers unprotected .....	13		13	13	1,000	6	461	461
Officers protected .....	2		2	None				
Marines at bayou .....			16	None				
Families not protected (except children) .....			5	5	1,000	3	600	600
Families protected .....			2	None				
Children .....			12	10	833	None		
Servants (colored) .....		9	9	4	444	2	500	222
Iron-clads and tug Rose .....	85		35	18	514	6	333	171
Officers and men in navy-yard .....	46		28	26	932	11	423	392
Officers arrived during epidemic and protected .....			2	None				
Officers arrived during epidemic and not protected .....			1	1	1,000			

The fatality among naval officers not protected by having passed through the disease was enormous (461 per 1,000). For an officer thus unprotected to come here in the summer season is the most forlorn of forlorn hopes.

Commodore Woolsey, during the recent epidemic, saved two acting assistant surgeons by ordering them to go on board the monitors, and directing them to keep away from the hospitals and other infected places.

Our inquiries into the sanitary condition of the navy-yard were in the main very satisfactory. The paths are nicely paved with bricks, all very neat and clean, and shaded by handsome

trees. The general surface is very pure beach-sand, deep enough for good subsoil drainage, and it is shaded by handsome clumps of live-oak trees and pines.

The hospital building in the yard is not fit for any imaginable use in the navy-yard. It is a rough, decayed wooden shed; has a good roof, and might serve as a hay-barn if moved to the country. We would recommend that it be sold, with the condition that it be promptly removed, or given away or burned, for its material is hardly worth the expense of removing it. The surface occupied by these wretched buildings if raked over and sown with grass-seed would be disinfected thoroughly by two or three showers of rain.

The marine barracks—an old stable—are rather worse than the hospital, not good enough for a prudent man's horse. They, however, have solid brick walls and a good roof, and might be used for some sort of store-house. We would recommend that they be preserved for stowing coal, or some such use; but the floor should be entirely removed, and the ground and walls thoroughly sprinkled from time to time with chemical disinfectants. This work should be completed before the 1st of March. Certainly this foul building should not be used as a human habitation.

The land of the reservation immediately contiguous to the yard is like the navy-yard—a surface of white sand, deep enough for subsoil drainage, except where the surface is much depressed, and then the water after a rain stands in ponds till it has time to soak away. We are inclined to think that the mistake has been made at some time of trying to drain some of these ponds, thus converting them into marshes.

We are safe in assuming that well-drained dry land is healthy, and equally safe in the opinion that lakes and large ponds are not dangerous, but the intermediate condition of marshy land is very deadly from malarious infection.

Now, this draining may have changed ponds into marshes, and thus have occasioned a good deal of deadly remittent fever for the time. The effect, however, in the long run, has doubtless been to lessen the aggregate amount of marshy land, so that we would recommend to keep up this drainage. But the open surface drains at present in use are not quite effective or economical. They are constantly filling up with the loose sand and sticks, so as to require constant labor in cleaning them out.

The substitution of common agricultural drain-pipe would scarcely cost more than a single cleaning out, and would last for centuries without any repairs whatever.

The pine groves on the reservation are very important in protecting the health of the officers and men stationed here. The destructive fever in this region—destroying more lives in the aggregate than yellow fever—is the congestive remittent, the deadly variety of malarial fever.

There is no malarial fever in the pines, except of persons contracting the fever elsewhere. If no barracks are to be found for the marines, they had better encamp in the pines than remain in that stable. Perhaps it would be best to do away with the marine guard altogether on the station. They are mostly young men, enlisted at the North, come here altogether unacclimated, and many of them die the first autumn after their arrival on the station.

The pines referred to need no care except to prevent them from being disturbed. Goats pasture on the reservation, and probably destroy many trees, especially near the beach, where they are most needed.

There would probably be no harm in cutting some as fuel for both Warrington and Woolsey, provided no trees were cut except such as might be marked for the purpose by an expert gardener.

The quarantine established by the city of Pensacola against

the infected shipping was rather worse than useless, because enacted under the very crudest imaginable notions as to what a quarantine should be.

Reckless men were ordered to go to a rather disagreeable place and stay there. Is it astonishing that sailors delirious with fever or fright deserted? Was it reasonable to expect that the stevedores and others should abstain from turning an honest penny? This quarantine had no good influence. It had no real force, moral nor material. If it had been enforced it would have been still worse.

The quarantine cordon established at the Junction, about 45 miles from Pensacola, in the pines, for the protection of Montgomery and Mobile, was in every way as good and reasonable as is to be expected anywhere. It was very effective.

But there was no occasion for that inflexibility which obliged a physician to jump from a train in motion in order to get here. It became more rational when the train was permitted to stop at the next small station for passengers to get off, so that the physicians from New Orleans had no particular inconvenience in getting here—only a tramp of 10 miles through the forest. It was still better when the train stopped to let nurses off, about a mile from the Junction, at no regular station. To have had any regular stopping-place so near the Junction, considering the demoralization of the time, would have been dangerous to the cities of Alabama.

The quarantine of the naval reserve was worthless because it came too late. The fault seems to have been in waiting for some *official report* of the existence of the disease. Such a report never came, never should have been expected. We might as well expect a defeated general to make an official report of a lost battle. The information to be depended on is from vague rumors of the men from his scattered columns.

On the 8th and 9th of May, 1846, the Mexican forces met



with serious repulse, and in less than two weeks rumors of this reached Mazatlan; by the 1st of June the information was so definite that Commodore Sloat was off on the wings of the wind and planted the flag in California. It takes the mails two months to cross the same country, and official orders from Washington by way of Hudson's Bay reached the squadron about a year afterwards. Our State Department makes the same blunder as was made here. Our consuls in foreign countries are required to furnish information of existing infectious diseases, but we have never heard of such information coming in time for use.

Our quarantine authorities have no chance to be in time, except by catching the rumors as they fly.

Our reason for a quarantine next year, whether any disease is reported or not, is that the germs of the disease certainly exist—dormant for the winter, to revive next summer—so that there is no chance of avoiding “sporadic cases.”

We would make the following recommendations:

1st. With regard to the infected iron-clads Ajax and Saugus, as this is no case for doubtful and untried expedients, we can only recommend that they proceed north in time to have their stores removed during cold weather, and that they have at least one winter of thorough freezing before they are again placed in commission. The tug Rose, in the same category with the iron-clads, should be relieved and have a good freezing before she is used here again in the summer season.

2d. We have to recommend the destruction of the wooden buildings in the navy-yard which were used for hospital purposes during the recent epidemic, and those of 1863 and 1867, during the present winter months.

3d. We would recommend that the marines be removed from their present wretched barracks, and if nothing better can be done for them, that they encamp in the adjoining pine woods. The floor of this building should be removed.

4th. We recommend disinfection of all houses in which the disease has occurred, and their material from time to time, and that the dwelling-house G, in which the disease principally prevailed, be not occupied during the next season, and that care be taken of the fences so that children cannot get into it to play; and when this house is repaired for reoccupation, that it be done in the winter months.

5th. Until the quarantine of this port is made effective by Congressional legislation, and for one year longer, we would recommend that it be made obligatory on the commandant of this station, by department order, to establish a quarantine of the entire naval reservation every season. This order should make the following particulars obligatory :

1. The quarantine should begin as early as the 1st day of June, and not terminate till the 15th of November, after several frosts.

2. A marine picket should be placed at the bridge of the bayou.

3. The beach between the navy-yard and the bridge should be kept under observation during the day, and patrolled at night.

4. The boats on the bayou—reservation side—should be captured and hauled up to a sufficient distance from the water to prevent their being used.

5. The co-operation of the commandant at Fort Barrancas should be asked for the establishment of a line of pickets to the bayou in the neighborhood of the fort.

6. Place all naval vessels having yellow fever on board in quarantine, taking care that the crews of such vessels have proper attention.

7. Allow no person to pass to or from the reservation without a permit bearing the actual signature of the commandant.

8. The medical officer of the station should be made sanitary superintendent of the reservation, and should report to the commandant, with recommendations, anything coming under his notice requiring authoritative interference.

6th. In view of the terrific mortality among unprotected officers, we would recommend that no officers be ordered here during the prevalence of an epidemic ; if necessary, physicians of the neighborhood should be employed. Officers who have acquired comparative immunity from the disease will probably volunteer, and thus in course of time there will be a body of officers ready to assume such duties at all times. They will thus acquire some training in the duties belonging to the station. We shall then get rid of this awful destruction of life. If officers do not volunteer readily, the term of duty will naturally be extended to four or five years to those who choose the duty, and thus no material harm results.

7th. We would recommend the use of agricultural drain-pipe instead of the open ditches and surface drains, in the land of the reservation near the yard, except for the larger drains near the beach, where stronger material of larger size would be more suitable.

8th. We would recommend additional care to prevent trees on the reservation from being cut by unauthorized persons, and that the goats injuring the young trees be removed.

9th. We would recommend the use of the wash-house (32½ by 19 feet), on the site of the old hospital-grounds, as a ward for the accommodation of the few patients now remaining in the navy-yard ; for temporary occupation it needs no immediate repairs.

10th. In view of the character of quarantine established here this season by the city authorities, and of the utter inability of such communities to do any better, we would respectfully rec-

ommend that a quarantine system be established by national authority.

Very respectfully, &c.,

JOSEPH WILSON,

*Medical Director and President of the Board.*

HENRY O. MAYO,

*Medical Director United States Navy.*

J. R. TRYON,

*Surgeon United States Navy.*

## YELLOW FEVER AT THE NAVY-YARD, NEW YORK.

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BY JOSEPH G. AYERS, M. D.,  
SURGEON U. S. NAVY.

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I submit the following report of the facts connected with the appearance of yellow fever on board the Colorado and Vermont, at the cob-dock, navy-yard, New York, in July, 1878. The disease was limited to six cases, three of which proved fatal. All were under observation on board several days and then transferred to the United States naval hospital, Brooklyn. I am indebted to the medical officers of the hospital for their history while under their treatment, and have incorporated almost entirely the leading facts already submitted to the Bureau by Medical Director S. F. Coates, which will be found embraced in quotation marks. We present the main features of each case.

*John Hanford*, bayman, age 37, native of Connecticut, shipped at New York, July 31, 1877, of robust physique, fair health for some years, and temperate habits; attacked by chill at 8 a. m., July 9th, having suffered from malaise and soreness of muscles of back and extremities for some days. Chill followed by fever, nausea, severe supra-orbital headache and rachialgia, more distressing in back of neck and lumbar region.

10th.—9 a. m., temperature of axilla  $104^{\circ}$ ; pulse 90, full and strong; skin hot and dry; tongue coated with thick, creamy fur; great thirst and occasional vomiting of fluid tinged with bile; no abatement of pain; several full alvine discharges induced by ol. ricini. 8 p. m., temperature  $104^{\circ}$ ; pulse 92.

11th.—9 a. m., slept but little; temperature  $103^{\circ}.8$ ; pulse 92;

eyes a little suffused and faint yellowness of conjunctivæ; occasional hiccough; excessive irritability of stomach; vomited several times during day; fluid at first pale brown, and towards night somewhat deeper in tinge, not, however, becoming dark, but containing masses of mucus slightly streaked with a chocolate color; alvine evacuations thin and dark yellow; moderate amount of urine. 8 p. m., temperature  $101^{\circ}.7$ .

12th.—9 a. m., temperature  $101^{\circ}.5$ ; pulse 95 and weaker; little sleep; dull headache; pain in back and limbs ceased; very weak; tenderness of epigastrium on pressure; fauces congested and sore; vomited every half hour or hour during the night; character of matter ejected unchanged; hiccough; urine scanty; towards night slight delirium, but easily aroused to consciousness; 9 p. m., temperature  $99^{\circ}$ ; pulse 84.

13th.—9 a. m., temperature  $99^{\circ}$ ; pulse 90, intermittent and very compressible; very weak; mind clear; vomited but three or four times in twenty-four hours; during this time no dark vomit whatever; retains sufficient fluid aliment; considerable yellowness of skin and conjunctivæ; passed this morning 5 oz. of turbid, yellowish urine; slept soundly most of the night; feels very comfortable. Midday temperature  $101^{\circ}$ ; pulse 80.

"Admitted to the hospital at 2 p. m; temperature steadily declining; no vomiting, no diarrhœa, no complaint of pain; skin and eyes yellow; very weak; suffered much from transportation; retained stimulants, but with no effect; sank rapidly; at  $10\frac{1}{2}$  p. m., moribund, pulse nearly imperceptible.

"14th.—Died at 10 a. m. Just before dying eructated dark material in small quantity. Body became very yellow. Had a previous history of malarial poisoning."

*Holmes Wikoff*, assistant surgeon United States Navy, age 33, native of New Jersey, of delicate physique, health much impaired in recent years, seized on the evening of July 9 with

rigors, followed during the night by fever, sharp supra-orbital headache and pain in lumbar region and calves of legs.

10th.—9 a. m., temperature  $102^{\circ}.5$ ; pulse about 100; tongue lightly coated with creamy fur; skin moist; some vomiting; feels able to attend to his usual duties, but advised to remain in bed; evening temperature  $101^{\circ}.5$ .

11th.—9 a. m., temperature  $103^{\circ}$ ; pulse about 100 and rather compressible; tongue heavily coated; gastric irritability continues, but retains in small quantities beef essence and iced milk; slight suffusion of eyes, and headache; rachialgia and pain in legs nearly gone; dull pain in right hypochondrium with slight soreness on pressure; several alvine evacuations.

12th.—Morning temperature unchanged; fall of one degree at night; stomach less irritable and retains greater part of fluid aliment.

13th.—9 a. m., temperature  $102^{\circ}$ ; without pain; restless and sleeps but little; not much change apparent; evening temperature  $101^{\circ}.5$ .

14th.—9 a. m., temperature  $102^{\circ}$ ; pulse 98 and very compressible; feels very weak; retains considerable fluid aliment; urine voided in moderate quantity; skin and conjunctivæ faintly yellow. From the first had no dark-colored vomit. Prognosis favorable.

“At 11 a. m., admitted to the hospital. Eyes and skin yellow; conjunctivæ rough and congested; very weak; excessive irritability of stomach.

“14th, evening.—Same condition, but failing.

“15th.—Failing; in the evening very dark vomiting occurred, but by voluntary effort; persistent hiccough, arrested by chloroform.

“16th.—Vomiting ceased; food and stimulants retained, but no improvement; late in the evening vomited a very little dark substance and afterward became restless.

"17th.—Failing still; retained food and nourishing enemata. Died by asthenia at noon.

"In this case all the symptoms of a grave, bilious remittent fever were present, including tendency to remission in temperature. The case was very similar to many I have seen on the Central American coast, in Callao, and on the west coast of Mexico, when there was no suspicion of yellow fever. The deceased had had Chagres fever and severe recurrences of it. The previous condition of his digestive organs was unfavorable. The case was very dissimilar to the others, and by itself would not have been pronounced yellow fever."

*Michael Flynn*, machinist, age 36, native of Ireland; shipped at New York, November 25, 1876; previously in good health. July 8 and 9 suffered a considerable degree of malaise, head feeling hot and mental faculties dull; about 2 p. m., on the 10th, had a severe chill, which passed off in about two hours, being followed by severe pain in temples, occiput, lumbar region, and calves of legs; slight pain in epigastrium. Temperature at 8 p. m., 105°·5; pulse 82; slight delirium, and but little sleep during night.

11th.—9 a. m., temperature 103°·8; pulse 96, full and strong; tongue coated with white fur; a little vomiting this morning on taking a powder of calomel; but little pain; feeling better; bowels well opened in the forenoon. 8 p. m., no change in temperature and pulse; mild delirium during night, and slept but little.

12th.—9 a. m., temperature 102°; pulse 100; no pain anywhere; but little vomiting in last 24 hours; not any very marked degree of prostration. Admitted to hospital at 5.30 p. m.

"On admission to hospital, pulse 85, tongue coated, temperature 102°·8, slight diarrhœa, irritable stomach, no appetite, intellect dull; slight yellowness of skin and conjunctivæ.

"13th.—Condition improved in all respects.



"14th.—Doing well. Temperature 98°·8; evening, 100°·2.

"15th.—Doing well. Temperature normal; cessation of diarrhœa; no irritability of stomach.

"16th.—Same in all respects except that he became cross and irritable.

"17th.—No change for the worse except persistent hiccough.

"18th.—No change for the worse; hiccough checked; rather improving; 35 ounces of urine voided, dark and slightly albuminous, sp. gr. 1014, tinged with bile; eyes clearing.

"19th.—No change for the worse; seems better; slight tendency to hemorrhage from gums.

"21st.—Doing well; hemorrhagic tendency disappeared; no albumen in urine.

"24th.—Steadily improving; pulse 60; temperature normal. This case at first excited no suspicion, though the color, condition of conjunctivæ, albuminous urine (found later), character of pulse, and hemorrhagic tendency, placed it in the same category as the others. The most diagnostic symptoms of yellow fever were, however, absent.

"26th.—Doing well; prognosis favorable."

Rapidly recovered, and was discharged to duty September 19.

*George Francis Olney*, ordinary seaman, engineer's force, age 23, native of Brooklyn, N. Y., shipped July 1, 1878, of slender physique, fair general health, came under treatment for vaccinia, July 8, and on the morning of July 11 was seized with fever, preceded by vomiting, diarrhœa, and slight rigor. Temperature did not rise above 102° in the next 24 hours. Tongue was coated with white fur, had pain in back and limbs, and frontal headache. Sent to hospital on the afternoon of July 12. Temperature had declined to 100°·5. Diarrhœa continued.

"July 13.—Doing well; temperature 98°·2; pulse 80; tongue clean; out of bed." Speedily recovered.

Although the initial symptoms in this case were quite severe,

its brief duration unattended with much debility renders its nature doubtful. Occurring, however, at this time, we have considered it as probably yellow fever. I should state that it was not so considered at the hospital.

*Michael Connell*, landsman, age 27, native of Ireland, shipped at New York, June 21, 1878, was seized on the afternoon of July 11 with chill, slight vomiting, and headache. 8 p. m., temperature 104°; pulse about 100, full and strong.

12th.—9 a. m., temperature 103°·8; pulse 98; tongue lightly coated with white fur; but little nausea; bowels free; feels comfortable.

13th.—9 a. m., temperature 100°; pulse 86, and of good strength; no vomiting; slept tolerably well; elevation of evening temperature less than one degree.

14th.—Morning temperature 102°, evening 103°; pulse 90; no vomiting; retained fluid aliment very well; is weak, but feels comfortable.

15th.—9 a. m., temperature 101°; pulse 86, and compressible; tongue heavily coated with yellowish-white fur; some headache and nausea; no appetite; is weak; urine passed freely; has slight diarrhœa; general condition favorable. Sent to hospital at 10 a. m.

“On admission, occasional vomiting; pulse 96, weak, soft, and compressible; temperature 101°·4; retained food, etc., in very small quantities.

“16th.—No pain or tenderness anywhere; eyes suffused and red; no yellowness of skin or eyes; tongue coated; temperature 101°·4; pulse 95, varying.

“17th.—Somewhat improved; temperature 100°; no unfavorable symptoms; all changes for the better.

“18th.—Specific gravity of urine, 1013; amount, 36 ounces; contains traces of bile and a *great deal of albumen*; no tube casts.

“19th.—Doing well in all respects; temperature falling; very

weak; sufficiently nourished; albumen less; epithelial tube casts very abundant.

"20th.—Improving; pulse declined to 50, soft and full, very compressible; sleeps well; well nourished; enema of milk administered; fecal matter hard and light in color.

"24th.—Continues to improve; temperature normal; pulse has ranged from 50 to 60.

"25th.—Morning temperature about normal, slight increase at night; albumen and tube casts gradually disappearing.

"26th.—Increase of temperature, slight in the morning, more in the evening,  $1\frac{1}{2}$  degree at most; no other unfavorable symptom; pain in back, not very severe; no headache; bowels opened by enema; dejecta hard and dark; prognosis favorable except as to renal sequelæ."

From case paper: 30th. Temperature fallen to normal; urine unaltered; digestion good. At noon had nausea, followed by uræmic convulsions. Specific gravity of urine, 1007.

Improvement followed the employment of a hot bath, hot blankets, and stimulating enemata.

August 2.—Headache and nausea; 40 ounces of urine voided in 24 hours, sp. gr. 1009 to 1010; pulse soft, and varying from 76 to 100.

4th.—36 ounces of urine passed; sp. gr. 1004, albuminous; casts abundant; no œdema.

5th.—Sp. gr. of urine 1006, amount 40 ounces, improved in microscopic appearance; appetite good; gaining strength.

8th.—Only a trace of albumen in the urine, sp. gr. 1007 $\frac{1}{2}$ .

10th.—Still improving; small amount of albumen, and a few granular tube casts.

October 20.—Still in hospital; urine presenting slight traces of albumen, but no tube casts. General health at this time almost restored.

*Charles H. Hine*, ship's corporal, age 50, native of New York

City, shipped January 21, 1878, originally of robust physique, but health impaired by intemperate habits and a recent fracture of the skull, was seized with severe chill on the evening of July 13, having suffered for a day or two from malaise. During the night had high fever, severe frontal headache, pain in back, and, towards morning, in arms; diarrhœa; irritability of stomach, with vomiting.

14th.—9 a. m., temperature  $103^{\circ}.8$ ; pulse 100, full and strong; very little pain; moderate irritability of stomach, with occasional vomiting during the day. 8 p. m., temperature  $103^{\circ}$ .

15th.—8 a. m., temperature  $103^{\circ}$ ; pulse 80; not much change; slept little; moderate diarrhœa; urine passed freely. Sent to hospital at noon.

"On admission, depressed, irritable, restless; vomiting freely; no diarrhœa, but frequent desire to go to stool; skin hot, yellowish; eyes red and yellowish; pulse about 90, quick, soft, and feeble; food, etc., in small quantities, well retained.

"16th.—Vomits occasionally; restless and irritable; no diarrhœa; weaker; temperature falling slowly; urine scanty; stomach not irritable.

"17th.—No change in the morning nor through the day. At 10.30 p. m. complained of distress in stomach; had characteristic black vomit, immediately afterwards collapse; no return to consciousness; died at 1 a. m. on the 18th. Deceased had a distinct malarial history."

This case was considered typical, and Medical Director Coues, in charge of the hospital, at once reported the undoubted appearance of yellow fever, both to Commodore J. W. A. Nicholson, commandant of the naval station, and to the health authorities of Brooklyn.

The treatment presents nothing unusual. 20 to 30 grains of quinine daily, a hot mustard foot-bath in the initial stage, sinapisms to epigastrium and back, and when painful to the extremities, mild cathartics, ice internally, sponging with cold water

during height of pyrexia, and careful alimentation, were the remedies chiefly employed before removal to hospital.

Previous to seizure these patients were accustomed to sleep in the following localities: Dr. Wikoff, in the wardroom of the Colorado, on the side next to the cob-dock; Hine, on the starboard side of the gun-deck of the Vermont; Olney and Hanford, starboard side of berth-deck of Vermont; Connell, port side of gun-deck of Vermont.

Besides cases of yellow fever during the first half of July there were many cases of diarrhœa, which, although unattended with an exhausting degree of discharge, were marked with unusual depression, a heavily coated, creamy tongue, and total anorexia; or, as occurred in a number of cases, the same symptoms existed without diarrhœa, the tongue remaining heavily coated a week or more.

As to causation: In looking over the medical records of the receiving-ship at New York, for a period of twelve years, I find no serious degree of sickness in any one summer; a few mild cases of malarial fever, mostly intermittent, only occurring. The character of this outbreak points conclusively to an exotic origin, and we find it, undoubtedly, in some ballast brought from Havana and landed on the cob-dock. Other ballast was landed which probably served by its organic impurities, intensified by great heat and moisture, to rapidly extend the specific miasm. I give a history of all that was landed.

From the barque *Nellie May*, which cleared from Havre, France, were discharged May 8, light-colored, clayey earth, and stone.

From barque *Augustine Kobbe*, from Liverpool, England, May 29, earth, stone, and fragments of brick and mortar, apparently from excavations for buildings.

June 18 and 19, from barque *Juanita Clar*, which left Havana, Cuba, on the 29th of the previous month, ballast taken there, chiefly stone, with a small amount of clean looking earth.

June 24, from barque Andrea Lo Vico, from Liverpool, England, earth, brick, and mortar, apparently from excavations for buildings.

July 2 and 3, from ship Casilda, from London, England, dark-colored earth mixed with pieces of brick and mortar, offensive smelling, and apparently containing much organic matter. It was said to have been taken from excavations for a dock on the banks of the Thames.

A further circumstance in connection with the previous voyage of the Casilda: She left New York December 28, 1877, and January 16 put into St. Thomas, W. I., for repairs, where yellow fever is considered endemic; here part of her cargo was discharged and replaced. She sailed for London February 24, where she arrived April 5.

The ballast from these ships was spread over the dock to a depth varying from a few inches to two feet on either side of the Vermont, but the greater part, including most of that from the Juanita Clar, was deposited between the Vermont and the Colorado. Over the ballast from the Juanita Clar, except a small part left near the carpenter's shop, which was subsequently covered with fresh earth, was thrown a layer from the other ships six inches or more in depth. Some of the ballast from the Juanita Clar was less than 50 feet from the starboard side of the Vermont.

The following table exhibits the atmospheric conditions prevailing at that time:

Date.	10 A. M.				4 P. M.				10 P. M.				24 hours
	Barometer.	Thermometer.	Relative humidity.	Wind.	Thermometer.	Relative humidity.	Wind.	Barometer.	Thermometer.	Relative humidity.	Wind.	Rain-fall in inches.	
1876.													
June 20	29.95	21.6	56	S.W. by W.	29.95	26.1	38	S.E.	29.93	19.4	60	.....	Clear.
21	29.95	20.6	41	S.E.	29.98	26.6	41	S.E.	29.93	19.4	65	.....	Clear.
22	29.78	17.7	100	S.E.	29.75	19.4	100	S.W.	29.83	18.8	100	0.21	Raining.
23	29.95	17.7	90	S.W.	29.93	23.3	52	S.W.	29.83	18.8	70	1.21	Raining in forenoon. Otherwise clear.
24	29.95	20.6	70	S.W.	29.93	25.1	52	S.W.	29.83	18.8	74	.....	Clear.
25	29.95	21.6	50	S.W.	29.95	26.1	38	S.W.	29.93	21.1	91	0.11	Rain in evening. Otherwise clear.
26	30.13	22.2	50	S.W.	30.14	26.8	54	S.W. by W.	30.03	21.6	71	.....	Clear.
27	30.25	22.2	53	S.W.	30.15	26.9	46	N.W.	30.25	23.6	73	.....	Clear.
28	30.25	26.6	52	N.W.	30.20	24.2	54	S.E.	30.22	21.9	81	.....	Clear.
29	30.25	26.6	54	N.W.	30.20	24.2	54	S.E.	30.20	22.2	76	.....	Clear.
30	30.25	26.6	61	N.W.	30.20	24.2	54	S.E.	30.15	23.3	86	.....	Clear.
July 1	30.20	26.6	70	N.W.	30.15	24.8	61	S.W.	30.15	23.3	74	.....	Clear.
2	30.15	26.6	67	S.W.	30.15	24.8	61	S.W.	30.15	23.3	74	.....	Clear.
3	30.23	26.8	64	S.W.	30.18	25.5	62	N.W.	30.13	22.7	57	.....	Light rain in afternoon. Otherwise clear.
4	30.23	26.8	64	S.W.	30.18	25.5	62	N.W.	30.13	22.7	57	.....	Clear.
5	30.05	25.5	75	N.E.	30.18	25.5	62	N.W.	30.13	22.7	57	.....	Clear.
6	30.08	21.1	53	N.W.	30.05	20.9	37	N.W.	30.09	23.4	41	.....	Clear.
7	30.18	24.4	45	S.W.	30.12	27.2	70	S.W.	30.13	22.7	52	.....	Clear.
8	30.13	26.1	66	S.W.	30.09	24.6	45	S.W.	30.10	23.3	52	.....	Light rain in night. Otherwise clear.
9	30.18	25.5	82	S.W.	30.05	25.5	66	S.W.	30.10	23.3	70	.....	Rain in afternoon. Otherwise clear.
10	30.08	23.8	91	S.E.	30.05	25.5	66	S.W.	30.10	23.3	77	.....	Raining.
11	30.25	26.6	69	N.E. by N.	30.25	25.5	66	S.W.	30.10	23.3	77	.....	Clear.
12	30.30	26.6	73	N.E.	30.10	10.4	95	N.E. by N.	30.10	20.5	96	0.29	Raining.
13	30.10	23.8	93	N.E.	30.12	26.6	67	N.E. by N.	30.12	18.3	79	1.76	Cloudy, with rain in early part of afternoon, and at night.
14	30.09	23.3	82	S.W. by W.	30.10	26.1	70	S.	30.12	18.3	80	0.04	Rain in early part of forenoon. Other- wise clear.
15	30.09	21.6	71	N.	30.10	28.8	54	E.N.E.	30.10	19.4	44	.....	Clear.
16	30.20	23.3	70	S.W.	30.18	22.7	50	S.E.	30.17	18.3	90	.....	Clear.
17	30.10	23.3	67	S.W.	30.10	23.8	78	S.E.	30.17	23.6	91	.....	Cloudy.
18	30.10	23.4	72	S.W.	30.09	26.6	62	S.W.	30.17	27.7	80	.....	Clear.
19	29.95	26.6	66	W. by N.	29.95	26.6	55	S.W.	29.95	26.6	64	.....	Clear.
20	29.95	27.2	60	N.E.	29.95	26.6	55	S.E.	30.00	26.6	82	.....	Clear.

None of the men of the receiving-ship worked on the Juanita Clar, but thirteen of her crew helped discharge ballast from the hold of the Casilda. Not one of these had fever, nor, so far as we could learn, suffered in health.

The Juanita Clar had been some time engaged in the West India trade. No sickness during her passage was reported and she was not detained in quarantine. It appears almost certain, however, that she imported the disease, although it is possible that the Casilda was infected. There had been no yellow fever on the Casilda.

When the fever first appeared we regarded as its possible cause the dredging of the Wallabout Channel, near the cob-dock, into which discharges, some three hundred yards from the Vermont, one of the main sewers of Brooklyn. Dredging this part of the channel was begun early in the spring. The last several days of June, and the first week in July, the dredger was at work near the Vermont; and about July 1 less than one hundred feet from her bow. About the 10th it was moved outside the scow-line, and July 19 work was suspended near the stern of the Colorado.

What influence this had it is impossible to determine, but it is certain that mephitic gases were liberated, recognized by their offensive smell, which extended over the cob-dock and through the receiving-ships. It is reasonable to suppose that the air of the cob-dock was further vitiated by organic effluvia from the ooze as it lay in the scows exposed to the hot sun. The material excavated, however, had been always quickly removed to the low grounds near the southeast corner of the navy-yard. The workmen employed on the dredger did not suffer, but the history of filth diseases shows that while some escape—perhaps by tolerance—others not habituated to the poison suffer seriously. The discontinuance of this work was early suggested, and Commodore Nicholson had it suspended until cold weather.



From the first appearance of the fever all excreta of patients were carefully disinfected with carbolic acid—acid 1, water 20 parts. This solution and chloride of lime, were used freely in all privies, through which, also, while the Colorado was at the dock, a constant stream of water was kept running; carbolic acid was also freely put in the bilges of both the Colorado and the Vermont.

July 14.—The crew, excepting a few considered necessary for the care of the ship, removed from the Vermont at night.

18th.—Burned in the furnaces of the steam-boilers on the cob-dock all bedding of fever patients, except blankets, which were subjected to sulphurous oxide and then washed.

19th.—Vermont entirely abandoned, and her sick-bay, medical store-room, cots, and hospital linen, disinfected with sulphurous oxide. Cots were afterwards soaked in a solution consisting of 1 part of carbolic acid in 40 parts of water, and scrubbed. About half of the surface of the ballast had been sown with oats, which now stood some twelve inches high, and this was sprinkled from watering-pots, until it was quite wet, with the following solution: Acid. carbol., 26½ pounds; ferri sulphas, 200 pounds; aqua, 200 gallons. The small portion of the ballast of the Juanita Clar left uncovered was thoroughly saturated with the above solution, and it and the remaining ballast was thickly sprinkled with chloride of lime, some three-quarters of a ton being used.

A board, consisting of Surgeon G. S. Beardsley, Passed Assistant Surgeon Robert Swan, the latter attached to the Colorado, and the writer, reported to the commandant the probable cause of the outbreak, with the following recommendations: "That the officers and men be removed from the cob-dock and from the Colorado and Vermont until the summer is over, that no stores and as little clothing as possible be transferred from the ships, and that dredging be suspended until the summer is over." Dr. Beardsley did not fully concur, reporting as follows: "I

fully concur in the above report except as to recommendation concerning removal from Colorado, for which I would substitute as follows: that all be transferred to the Colorado and the ship then be hauled into the stream."

20th.—Vermont below spar-deck disinfected with sulphurous oxide. A considerable quantity of stores from the cob-dock and Vermont were put on board the Colorado, and she was hauled out to the navy-yard buoy, in the East River, about two hundred yards from the cob-dock. A patrol of marines was stationed on the dock to guard the public property from incursions of river thieves, and, except when on duty, were quartered on board the Colorado.

22d.—The orlop and berth decks of the Vermont, and berth-deck and hold of the Colorado, disinfected with carbolic acid, atomized by the steam apparatus invented by Surgeon H. M. Wells, U. S. N., who kindly superintended the operation, steam being taken from a tug alongside; surface of ballast again well wet with solution of carbolic acid, 1 pound to 7 gallons of water.

These were the principal sanitary measures, and, so far as found practicable, received the ready approval of Captain Bancroft Gherardi, commanding the Colorado, who afforded all possible aid in their execution.

The accompanying map shows the localities mentioned.

No febrile disease appeared after the above date until July 30, when a few mild cases of remittent and malarial fever occurred. With these exceptions, the health of the crew has been remarkably good.

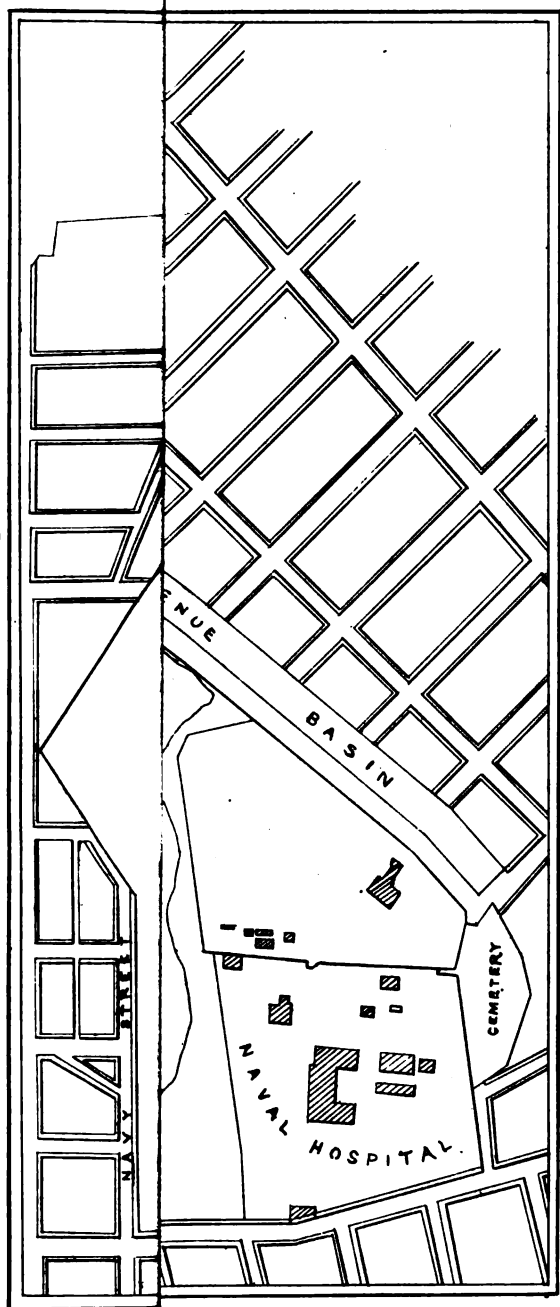
The Colorado returned to the cob-dock on the 16th of October. It is proposed not to use the Vermont until some time after the appearance of freezing weather.

As perhaps corroborative of the existence, in the first half of July, of a general influence deleterious to health in the vicinity

of the cob-dock—if not wholly the specific germs of yellow fever, at least some active miasm—we present the following account of an unusual degree of sickness which occurred on the naval vessels *Constellation* and *Powhatan*, taken from notes kindly furnished by Drs. E. C. Ver Meulen and W. H. Rush, of the *Constellation*, and Dr. W. S. Dixon, of the *Powhatan*.

The *Constellation* arrived at the navy-yard from Havre, France, on the 7th of July, after a passage of fifty-seven days, and went alongside of the cob-dock, a little to the eastward of the *Vermont*. She lay there until the 10th, when her berth was shifted to the other side of the channel, but after a day or two was taken to the ordnance-dock, and remained there until the 15th, when she sailed for Annapolis, Md., where she arrived July 24. During the passage to Annapolis, there were many cases of diarrhœa, accompanied in several instances by some degree of fever. The following tables, as substantially prepared by Dr. Rush, exhibit the career of the severer cases :







Profuse diarrhœa, tormina, and a considerable degree of tenesmus were the most prominent symptoms. In all, the tongue was coated with white fur; urine scanty, high colored, and free from albumen. No marked irritability of the stomach—in case 4 vomiting occurred once. Frontal headache occurred in cases 2 and 6. All recovered speedily except case 2, which terminated in chronic dysentery and was sent to the naval hospital at Norfolk.

The Powhatan lay at the navy-yard wharf, nearly opposite the Vermont, from about the 2d to the 17th of July, and later, for some weeks, at this wharf, further to the westward, and had the following cases:

William H. Pierce, boatswain's mate, July 16, seized with chill preceded for two days by pain in head and back, temperature ranging from  $102^{\circ}$  to  $104^{\circ}$  the following two days and then slowly declining. Had vomiting the first night. Bowels confined. Case considered remittent fever. Discharged to duty July 20.

William Atkins, ship's cook, seized with chill at noon July 18, followed by headache and high fever, temperature reaching  $104^{\circ}.5$ . Ensuing day had chilly sensations but no fever, and felt nearly well. Case considered remittent fever. Discharged to duty July 22.

William Hayes, private marine, applied for treatment July 20, having had malaise two days. Had vomiting of yellowish-brown matter during the entire day; tongue thickly coated; severe headache and pain in back and calves of legs; skin and conjunctivæ very yellow; bowels constipated. Thermometer frequently applied did not show a higher temperature than  $99^{\circ}$ . Quickly recovered.

These cases were treated with quinine in large doses. Between the 1st and 27th of July, there were ten cases of acute

diarrhœa, in several instances accompanied with fever, but all yielded readily to treatment.

As pertinent to this report I may add the following instance of sanitary precaution :

On the 1st of last August, twenty-five unacclimated men of the crew of the United States iron-clad *Canonicus*, then lying at New Orleans, La., where an epidemic of yellow fever prevailed, were sent north by steamer, as a sanitary measure, and arrived at the navy-yard, New York, on the 6th of the month. There was no sickness during the voyage nor had there been any yellow fever on the *Canonicus*. They were landed on the cob-dock, given a hot bath, and their clothing and bedding disinfected with sulphurous oxide, some twenty pounds of sulphur being burned in the guard-room. Thirteen of these men were marines and went to the marine barracks. The others, after burning their bedding, hammocks, and clothes-bags, were taken on board the *Colorado*. During disinfection every article of clothing was unfolded and hung on lines stretched across the room, or on the walls, and even the contents of ditty-boxes were turned out. No fever followed, although it is probable that at the time the men left the *Canonicus* she was already infected with the miasm of yellow fever, as this disease with some deaths occurred on board shortly afterward.



## YELLOW FEVER AT KEY WEST, FLA., 1878.

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BY R. J. PERRY, M. D.,  
ACTING ASSISTANT SURGEON.

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The comparatively small number of cases of yellow fever at Key West during the past summer, fortunately on account of the presence of so few strangers to the climate, may possibly greatly detract from the interest and relative importance of a report from this port; but if a single fact in connection with this disease be evolved therefrom, its preparation, though brief and imperfect, will be attended with some benefit, for if there be one medical subject confused, uncertain, and theoretically conjectural and unsatisfactory in practice more than all others, it is the subject of yellow fever, whether as to its origin, progress, prognosis, treatment, prevention, or cure. Having passed through quite a number of epidemics of this disease, here and elsewhere, I am forced to the conclusion, from experience and observation, that the prominent idea of to-day, apparently uncontestedly well founded, proves valueless by the adverse phase of to-morrow.

*Presumable origin.*—The Norwegian ship Marie Fredreickke arrived at Key West June 24, having left New Orleans June 3, laden with cotton in bales, staves, and resin. This ship had been in New Orleans several weeks undergoing extensive repairs, many of her old timbers taken out and others substituted, whether new or not I am unable to say. Five days subsequent to her arrival here, June 29, her first officer was taken

sick, and was visited by a physician of the city on board until July 1, when the patient was removed to a private room on shore. The true nature of the disease in this case was not decided upon until the afternoon of July 3, when, being called in consultation, I did not hesitate to pronounce it at once a typical case of yellow fever; and immediate inquiries into the previous history confirmed my diagnosis, for my suspicions being aroused by some black-looking spots upon the sides of the wash-bowl near by, I was informed by the attendants that quite a quantity of this same dark-looking fluid was ejected from the stomach several hours before. The patient died the same afternoon, fourth day of the disease, about three hours after I first saw him, developing all the peculiar physical appearances of the disease after death.

The next case reported was that of a telegraph-operator on shore, a young gentleman twenty-two years of age, of most exemplary habits, attacked July 8, four days subsequent to the death of the first case, and died July 11 with black vomit. No personal contact is traceable between these two cases, but it is asserted by some with positive certainty that the telegraph-operator visited the ship *Marie Fredreickke* several days before he was taken sick; by others, that he was upon several different occasions seen upon the wharf in the immediate neighborhood of the aforesaid vessel. The *Marie Fredreickke* was ordered to the quarantine station July 6, but did not obey the order until the 8th. In quarantine four additional cases were developed on board, a day or two intervening between the various attacks. Up to this time the health of Key West had been good; no suspicious case of fever or other disease had been reported or noticed in the practice of any physician of the city. From the foregoing facts, the introduction of the disease into this port the past summer is most generally attributed to the ship *Marie Fredreickke*. That Key West would have entirely

escaped if pratique had been denied this ship I am not prepared to affirm, for the same causes, conducing to the almost undoubted local origin of the disease in the years 1869 and 1875, are not now, nor have they been absent during 1878. The very few strangers on the island, and the ordinarily correct habits of these, might *possibly* have afforded immunity, but for the presence of the ship above referred to.

*Clinical history.*—Of the thirty-three or thirty-four cases reported from the 3d of July to the 13th of October (date of deaths first and last cases the past summer) there was about an equal division of severe and mild attacks, the former terminating fatally, the latter in recovery. The milder, manageable cases presented no unusual symptomatic phenomena, whilst those more violently attacked were in some instances attended with such unlooked-for and untoward complications from the inception of the disease, and a termination so rapidly fatal, as to induce the very common expression, among even the well informed, that the malady we were combating was not yellow fever, but some terrible plague, and from which even the natives could scarcely hope to escape. Several of these cases coming under my own observation died in from thirty to sixty hours, with no black vomit or yellowness of skin. The mode of attack, progress, and duration of these malignant, fatal cases was unaccountably variable. In some, all the secretions were apparently thoroughly re-established and active almost entirely throughout, whilst in others the bowels, skin, and kidneys offered not the slightest response to remedies exhibited in either stage of the disease. In some the mental faculties remained for the most part unimpaired; in others a marked depression and obscurity of mind was manifest, frequently amounting to violent and alarming delirium *ab initio*. Severer general congestion, a darker bronze or dusky aspect of skin, than in former years was noted in the more violent cases, but in the majority

of all those attacked there was less disposition to constipation of bowels and irritability of stomach than we ordinarily look for and generally meet with in this disease. The most favorable physical appearances and encouraging conditions of mind and body during the progress of attack argued nothing as to the final result. The gradual decrease of temperature and pulse after twenty-four, thirty-six, or forty-eight hours had elapsed afforded stronger grounds for the expectancy of recovery than other conditions met with. All other proved more or less illusory. As matters of reference and interest, I here append a record of temperature and pulse of two cases, as indicative of probably the general average in this respect.

*Clinical record.*

AT KEY WEST.

733

No. 1.	First day.			Second day.			Third day.		Fourth day.			Remarks.
	Morning.	Noon.	Evening.	Morning.	Noon.	Evening.	Morning.	Noon.	Morning.	Noon.	Evening.	
Temperature .....	103° 9	103° 9	103°	103°	102° 7	102° 7	101°	101°	98°	98°	98°	Recovered.
Pulse .....	116	116	114	112	112	108	100	98	80	78	76	
No. 2.	First day.			Second day.			Third day.		Fourth day.			Remarks.
	Morning.	Noon.	Evening.	Morning.	Noon.	Evening.	Morning.	Noon.	Morning.	Noon.	Evening.	
Temperature .....	104°	104°	104°	104°	104°	104°	103° 9	103° 7	98°	.....	.....	Died immediately ; no black vomit ; no yellowness.
Pulse .....	130	130	130	128	128	124	106	118	80	.....	.....	

In case 2, a marked decrease of temperature and pulse is observed on the morning of the third day, this immediately after the patient had enjoyed four or six hours of sleep; by noon, however, the previous condition is almost entirely resumed, and the case terminates fatally in sixty hours from time of attack.

The official papers on file in the health department of the city record the disease and results as follows:

Month.	Cases.	Deaths.	Remarks.
July .....	14	5	First case was attacked on June 29th, but was not reported until date of death, July 3.
August .....	6	4	
September .....	11	7	
October .....	2	1	
Total.....	33	17	

*Sanitary condition of Key West.*—The island of Key West is in length about six or seven miles, in breadth one and one-half mile; is 12 feet above sea-level, and of very irregular shape. The city is situated upon the west end, and contained at last census a mixed population of thirteen or fourteen thousand, many of its inhabitants being Cuban refugees. The city is subject to strong wind-currents, is imperfectly drained by open and covered sewers, which for the greater part of the year are filled with stagnant, foul, odoriferous gases and accumulations of filth and garbage of every description, and in the city at many and various points foul stagnant pools of water are to be encountered, the exhalations from which are of no uncertain character. Added to all these morbid influences are the decayed, dead, and dying sponges oftentimes spread out upon the wharves and landings on the northern and northeastern side of the city, and from which odors most acrid and nauseating are almost constantly exhaled.

The health authorities, though reasonably vigilant, seem almost powerless to remedy these most potent evils, by reason of

the intense, outspoken objection on the part of the general citizenship to any increased taxation, even for their own benefit, either mentally, physically, or pecuniarily, direct or remote. The majority of the virulent and fatal cases of fever during this year were living along the course or in the neighborhood of the cesspools and sewers above referred to. In this connection a tabular statement of meteorological observations taken at this port for the months of July, August, September, and October, 1878, is here appended.

*Thermometrical.*

Month.	Meantemperature.	Maximum.	Minimum.	Greatest daily range.	Least daily range.
July.....	84.9	93	73	14	7
August.....	85.3	94	76	16	6
September.....	82.6	92	76	14	5
October.....	78.6	90	66	14	4

*Barometrical.*

Month.	Mean.	Highest.	Lowest.
July.....	29.979	30.105	29.772
August.....	29.990	30.108	29.830
September.....	29.910	30.100	29.443
October.....	29.979	30.143	29.533

*Moisture.*

Month.	Mean humidity.	Greatest daily mean.	Least daily mean.
July.....	72.0	84.3	65.7
August.....	70.7	81.0	65.7
September.....	78.2	89.7	69.7
October.....	75.7	93.3	67.3

Prevailing winds: July, S. E.; August, S. E.; September, E.; October, N. E.

*Quarantine regulations of Key West.*—The quarantine regulations of this port are enacted by the common council, *ex officio* as a board of health, usually without any reference to or consultation with the health officer of the city and port, or other medical authority. These regulations, frequently of absurd and ambiguous tenor, the health officer is required to enforce, with practically no discretion allowed. I feel perfectly well convinced that but seldom, if ever, has quarantine as practiced at this and other ports on the Atlantic and Gulf coasts been the means of protection against the introduction or prevalence of yellow fever.

I will now conclude this report with the probably hazardous remark that if the deservedly high authorities now having this subject under discussion and advisement should determine yellow fever to be an exotic disease, our only protection lies in an enforced, radical, and indiscriminate non-intercourse with any port liable to be infected, for at least six months of the year. In that view of the case, is the price we would pay for exemption too dear?



# LEPROSY.

BY GEORGE W. WOODS, M. D.,

SURGEON U. S. NAVY.

(ELEPHANTIASIS GRÆCORUM.)

SYNONYMS.—Spedalsked (Norway); *Lepra leontiasis*; *Satyriasis*; *Lepra Hebrorum*; *Lepra tuberculosa*; *Lepra anæsthetica*; *Lepra elephanta*; *Tzara'ath* (of the Jews); Eastern leprosy; True leprosy.

## ITS HISTORY.

Elephantiasis Græcorum has existed from the most ancient times in eastern countries, and is frequently mentioned in the Old Testament, where it is specially made the subject of Levitical law, and assumes great importance in the scriptural history of the Israelites, being most graphically described in the xiii<sup>th</sup> chapter of Leviticus. *Buenemia*, or “Barbadoes leg,” is, however, associated with true leprosy in the Mosaic law; and most probably *lepra* and *psoriasis*, *eczema* and *scabies*, as well as *leucoderma*, were equally confounded with this disease among the ancient Jews, as they certainly were in the middle ages. The leprosy of Naaman, Gehazi, and Moses was probably either white leprosy (now known as *leucoderma*) or *morphœa alba*, allied diseases.

(The leprosy therefore of Naaman shall cleave unto thee [Gehazi] and unto thy seed forever. And he went from his presence a leper white as snow.—II Kings, v, 27.

And he [Moses] put his hand into his bosom; and when he took it out, behold, his hand was leprous as snow.—Exodus, iv, 6.)

In the case of Barbadoes leg the error of mediæval writers

has been attributed to the faulty translation into Latin of the works of Avicenna, in which this disease was rendered as elephantiasis, while true leprosy was denominated *lepra*. By the Greeks the latter term was employed to denote psoriasis alone, while leontiasis and elephantiasis were applied to leprosy, and the disease known to us as Barbadoes leg was not recognized. Although these diseases received much study from the earlier writers, so that their differential diagnosis was perfect, and the two forms of true leprosy were fully recognized, great confusion existed for a long period in the use of designating names. This confusion has been in some degree overcome by the use of Elephantiasis Græcorum and Elephantiasis Arabum as distinguishing terms for true leprosy and bucnemia; but the word *lepra* is still applied generically to leprosy, and also to a form of psoriasis in Willan's classification of skin diseases.

With the decline of the Roman Empire a current of emigration spread leprosy over Europe, and, with the return of the Crusaders, it was more widely disseminated. In the thirteenth and fourteenth centuries there was scarcely a town in which the disease did not exist, and houses for the reception of lepers covered the land, where pious brothers of the order of St. Lazarus devoted their lives and services to the care of those affected with this incurable malady. This order was instituted in the eighth century, but leper-houses were established in England before the first Crusade, and in Germany, it is said, as early as the fifth century, while Pepin's laws in regard to leprosy bear date 759, A. D.

It is estimated that Europe at one time contained nineteen thousand lazar-houses. These were hygienic and religious rather than medical institutions, supported by charity, and intended for isolation, not cure. Their number, as estimated by Matthew Paris, seems enormous, and it may be that his translator has confounded the buildings belonging to the Hos-

pitalarie (Knights of St. John) with the institutions specially devoted to lepers; but even admitting this, they were a feature of every considerable town and city in Europe in the fourteenth century. At this period the disease became so widespread that many writers are inclined to attribute its general and rapid dissemination to an epidemic character engrafted upon the malady, and its subsequent subsidence into an endemic disease to be due to a cessation of this influence. Whether this epidemic condition was active or not, under some peculiar influence leprosy was disseminated with great rapidity, and a terrible fear took hold of the people.

Between 1374 and 1392 occurred the famous "conspiracy of lepers," the history of which shows the widespread character of the disease, and that isolation was not at this time perfectly maintained. It was universally believed that the lepers throughout Europe had sent representatives to four general assemblies and were perfecting a plan to spread the disease by poisoning springs and fountains and employing the arts of sorcery. It was a cruel hoax, but during the excitement many lepers were condemned to be burned.

In all the countries of Europe it had long been recognized as the duty of both church and state to stamp out the accursed disease, and to this end they worked in earnest accord during the fourteenth and fifteenth centuries. Bulls were issued by the Popes, and the most stringent laws were passed by most of the potentates of Europe in regard to the medical examination, condemnation, and status of lepers, including such as prevented their association with the unaffected. The leper was made legally and politically a dead man; his marriage ties were dissolved; the service for the dead was performed over him, and he became an outcast clothed in the leper's garb, forbidden to defile by his touch any article of food, or running water, to enter any church or place where food was prepared; compelled to

make his dwelling within the limits of a lazar house, and to indicate his approach by the ringing of a bell or the use of clappers. These measures had their effect in rapidly stamping out the disease, and in the seventeenth century it had ceased to be a terror.

In our own day, in Europe, leprosy attracts but little attention, and is apparently disappearing, save in the far North, where, in Norway, under the name of *spedalsked*, it still prevails and seems to be increasing. In the island of Crete a similar condition exists. At present leprosy is found principally in India, China, the Malaysian Archipelago, Egypt, Palestine, Turkey, the Grecian Islands, the coast of the Black Sea, many of the Mediterranean ports, Spain, Portugal, Norway, Russia, Iceland, Scotland, Madeira, the Canaries, New Brunswick, Canada, Brazil, Mexico and Central America, Madagascar, the entire continent of Africa, Mauritius, the Seychelles, New Zealand, and the Hawaiian Islands.

This wide distribution to places where it has no ancient, nor yet a very modern history (as in the Hawaiian Group), must be associated with that tide of immigration which followed the era of Portuguese and Spanish discovery, corresponding to a time just subsequent to that period when leprosy was scourging the European continent. In the United States it is only found in New Orleans, La., and rarely, among the Chinese residents of California. Twenty cases have been observed by Dr. Nichols in Sacramento, and in 1876 a number of lepers were sent from San Francisco to China by the municipal authorities.

In Norway, in 1865, it was estimated there were 3,000 lepers. The number at present is in excess of this estimate. At Bergen a large hospital is devoted to their care.

Until the appearance of a report by Dr. Danielsten and Prof. Boeck of this hospital (1847), who had carefully studied the disease, but little was known of its character in the light of

modern scientific methods of observation. It received further study from Mr. Erasmus Wilson and Dr. Neumann, but the most valuable information yet offered is embodied in answers to questions propounded by the College of Physicians of London to competent medical men in those places where leprosy existed, but especially to surgeons in the East Indian service, who have given the most valuable information in their reports, numbering 107. We are also greatly indebted to the valuable researches of Dr. H. D. Carter, of the Bombay presidency.

From the writings of these various gentlemen, and the reports to the College of Physicians, we seem to have the following facts in regard to leprosy well established:

1st. It is not a form of syphilis.

2d. It is a specific and well-marked disease.

3d. There are two varieties, anæsthetic and tubercular.

4th. The two varieties may be distinct or associated.

5th. It is more common in the male than in the female.

6th. It is hereditary.

7th. It is contagious. (The majority of East Indian surgeons declared against its contagious character, but many have since reversed their decision.)

8th. It is incurable.

9th. Europeans are to a certain degree exempt, but probably only through lack of exposure to contagion.

10th. The cause of the disease is unknown.

11th. Leprosy disappears with an improvement in the hygienic condition and diet of a people, and thorough cultivation of the soil (the Hawaiian Islands apparently an exception to this rule).

#### THE DISEASE.

*The prodromic stage.*—The first signs of the approach of leprosy are weariness after slight exertion and a tendency toward melancholy. There is slight numbness in those parts where the

disease is to appear; swelling in the course of the nerves, and often an erythematous eruption which may appear and disappear a number of times. Subsequently there is febrile excitement with intermittent chills, hyperæsthesia, pains in the limbs, swelling of the tissues covering the malar bone, and enlargement of the lobes of the ear. Great stress is laid on this hypertrophy as determining the diagnosis—a condition often delayed, however, until the disease is well established—especially the malar prominence, which is congested and shining, giving a characteristic ruddy appearance, especially after the stimulus of liquor, and heightening the beauty of the women. Besides these particular swellings, there is a glossy condition of the skin with an unctuous feeling, and many red and sensitive spots, which change gradually to a brown hue, or may disappear altogether. A vesicular eruption is often seen; and loss of sensation in spots, as well as in the course of the ulnar nerve, belongs to this stage. With many the general health is not affected at this time, and the appetite is voracious. In some cases a claw-like contraction of the fingers, to be mentioned hereafter, and loss of sensation, are the first evidences of the disease.

Most of the symptoms mentioned may be repeated several times before the disease is finally established as a permanent condition, and the duration of the period may extend to months and years.

*Tubercular leprosy.*—In the tuberculated form of leprosy, there is fever, with heat and pruritus of the skin, followed by an appearance of coppery-red patches which may appear and disappear several times. Gradually, however, these patches become elevated into tubercular excrescences, while there is a general thickening of the skin, swelling and œdema accompanying the changes. The face, hands, and feet are the most common seat of tubercular deposit, externally. In the face, this tuber-

cular condition is seen in an exaggeration of the natural furrows of the forehead, an extension of the brows, enlargement of the lobes of the ear, and lips, as well as the alæ of the nose, with great prominence of the cheeks. The whole hypertrophied surface is covered with tubercular nodules both great and small, and the face assumes a characteristic mulatto expression. Sometimes absorption of the deposit takes place leaving maculæ in the situation of the tubercles; but the condition is soon re-established, and at length suppuration occurs with a discharge of thickened pus. Ulceration also takes place, involving the subcutaneous and muscular tissue, but rarely the bones. The skin becomes denuded of hair, the eyebrows and eyelashes are swept away, as well as the beard, and there is ulceration of the cornea, conjunctivitis, and ectropion. It also involves the mucous membranes, the fauces, larynx, and nares being particularly the seat of the papillary deposit, producing ozæna, and resulting in loss of voice, difficulty of deglutition, and almost total annihilation of the senses of taste and smell, while the absorption of the nasal septum adds to the facial distortion.

*Anæsthetic leprosy.*—In the anæsthetic form of leprosy hyperæsthesia, often of a most distressing character, precedes the anæsthesia. The cutaneous changes may be very trivial, being confined to a dry, scaly, corrugated appearance; but, where well marked, there is ulceration commencing in an eruption of bullæ, or there may be similar patches to those appearing in the tubercular variety, which ulcerate more superficially, and discharge a thin pus, healing with smooth cicatrices denuded of hair. If the hair returns it is white, and often the entire cutaneous hair becomes blanched. Later on, the skin becomes dry and shrivelled, at first in spots, but subsequently involving the whole body. The ulcerative process seems to expend itself upon the fingers and toes most generally, the phalanges dropping off one by one, after becoming necrosed, or perhaps they

are absorbed, or crumble away, in the pus, the skin healing admirably after each amputation. There is often opacity of the cornea, ectropion with stillicidium, a tightness of the facial integuments, a drooping of the lower lip, and a look of premature old age; but vision and voice are not so much affected as in the tubercular form.

The characteristic feature of this variety, as indicated in its name, is the anæsthesia which affects the whole body, but the limbs principally. This is often so complete that lepers employed in culinary service have been known to burn themselves seriously without being aware of the fact; and it also explains the singular freedom from suffering which these people enjoy, although their hands and feet may be a mass of ulceration. The anæsthesia commences in spots, most generally associated with the maculæ which succeed the hyperæsthetic swellings, and spreads irregularly without reference to particular nervous distribution. In the distinct tubercular variety, there is some anæsthesia, but it is not so generally distributed a condition as in the true anæsthetic disease. In both forms the developments take place systematically, and the manifestations of the disease are most prominent in the face and limbs.

Well-marked and distinct cases of the two varieties of leprosy are not easily selected, there being more frequently a mixture of the two found in the same individual, though one or the other predominates.

Among the deformities produced by leprosy, the most marked is a contraction of the fingers, the thumb generally excepted, causing the hand to assume the appearance of a bird's claw, due to a permanent contraction of the extensor tendons or paralysis of the flexor muscles. Another is the distortion of the fingers after the loss of phalanges, and ulceration of the phalangeal articulations, the remaining phalanges standing at every conceivable angle. The ulceration generally terminates in loss of



the fingers, but rarely involves the metacarpal or metatarsal bones. As each successive phalanx disappears the tissues heal and the result is a stump which would do honor to the best surgery. This stump will, however, again ulcerate, another phalanx being removed, and so on until the palmar and plantar portions of the feet and hands remain, where, as a general rule, the process ends. This removal of parts is not usually an amputation, but a true osseous absorption, and oftentimes it is only the bone which is affected, the tissues contracting *with the nails* after the disappearance of the phalanges, the former adapting themselves in some rudimentary form to the metatarsal and metacarpal border. More generally, in the case of the nails, they become compressed laterally and fissured, the extremities of the fingers swell, ulceration takes place, and they gradually dissolve away in the discharge.

Recent writers speak of *macular leprosy*, in which the disease is characterized by anæsthetic maculæ which cause atrophy of the skin, shrivelling of the spots succeeding, with a shallow white or brown depression left finally. This is probably a stage rather than a distinct variety of leprosy. The stage in which parts are lost, has been termed *Lepa mutilans*.

There is a class of cases frequently met with in which there is a tubercular condition of the face, enlargement of the ear-lobes, and flattening of the nose, which renders the diagnosis of leprosy positive, and yet for years, or for life, they may enjoy perfect health, and no further development take place. Again, in some cases, intolerable pains take the place of anæsthesia, rendering the prognosis very unfavorable.

Leprosy sometimes shows itself in childhood, even as early as the third year, but it is rarely recognized before the age of puberty, from which time it occupies an average period of ten years to attain its development. The longevity of anæsthetic cases is often remarkable, and it would seem that, if patients are

properly cared for, this form of the disease did not influence the duration of life. In the tubercular form, however, with the extensive involvement of both skin and mucous membrane, the case is different. Death commonly takes place from marasmus or uncontrollable diarrhœa and dysentery, in either an acute or chronic form.

Lepers are highly susceptible to the influence of cold, and are often affected with pulmonary diseases, erysipelas, albuminous nephritis, and ascites, while no class of patients sooner show the influence of improper or insufficient food. Occasionally the tubercular form of leprosy becomes acute, ulceration occurs rapidly, and the disease runs its course in a few weeks. The average duration of distinct tubercular cases is eight years, and of anæsthetic cases eighteen years.

The most important points in association with the subject of leprosy are its relations to syphilis, its cause and inheritance, its contagion and eradication—subjects which I beg leave to treat briefly under these various heads.

#### THE RELATION OF SYPHILIS TO LEPROSY.

At most, syphilis seems to be only a predisposing cause, or productive of a cachectic condition favorable to the reception of the materies morbi of leprosy. This statement is confirmed by all medical men who have given any study to the subject of Hawaiian leprosy, being especially insisted on by Dr. G. Trouseau, and is substantially the verdict of the East Indian surgeons in their voluminous report.

At the leper settlement of Molokai, a large number of patients present signs of old syphilitic disease, and the majority acknowledge to having been affected with it in some form; but it is not active in the leper, and any *well-marked* syphilitic eruption is rarely met with, a diagnosis being, however, difficult in a disease characterized by such varied cutaneous effects. A variety of

eczema, known as *kuna* is very commonly observed, its discharge drying into extensive greenish-yellow crusts; also a vesicular eruption at first papular, known as *papu*, which is commonly supposed to be a form of scabies. Under the name of *pupu*, it is likely that a number of distinct eruptions accompanied by pruritus are associated, including true scabies. Tradition seems to prove that these diseases have been known for ages in the group, long anterior to the development of syphilis or leprosy, and, while obstinate, are curable.

#### THE ETIOLOGY AND PROPAGATION OF LEPROSY.

To determine the absolute cause of a disease in some specific poison is extremely difficult, and, in the case of leprosy, baffles all research. Its cause has been sought for in peculiarities of climate, soil, diet, and the habits of a people. As the disease is commonly met with in sea-girt countries, it has, in many instances, been attributed to dwelling in damp huts, to the use of peculiar food, especially stale or putrid fish, salted meats, and rancid oil, while, in the interior, inferior grain, or that grown on uncultivated soil, is condemned as acting in the same manner.

In the consideration of mediæval leprosy in England, great stress is laid on the universal use of salted meats, and straw bedding is also given its share of blame. Insufficient food and clothing, filthy habits, neglect of bathing, and exposure to unfavorable influences of climate or weather have also been considered to aid the effect of improper diet. In regions removed from the sea-shore, the disease has been supposed to originate in a paludal poison on account of the intermittent febrile attacks with which it commences. Dr. Kenlock Kirk considered the use in India of a certain leguminous seed known as *dahl* to be the grand cause of leprosy, and it certainly does develop a condition in many respects like leprosy, but its identity is not by any means proven. Danielssen and Boeck find a suf-

ficient cause for the disease in Norway in the use of rotten pickled herrings, and it is a curious fact that in the early part of this century the herring disappeared from the coast of Sweden, and transferred themselves to Bergen, the change being coincident with the commencing disappearance of leprosy in Sweden, and its increase in Norway.

As regards climate and soil, the wide geographical distribution of leprosy and its variety of situation preclude any causation here, it being equally fixed in northern or southern latitudes, in highlands and lowlands, on well and ill drained soils. Agriculture, it may be mentioned here, seems to be justly credited with an influence favorable to the disappearance of leprosy, but it is probably due not to any effect in the destruction of poisonous emanations, but to a general improvement in the condition of the people. In the matter of diet, as a cause, there is much to be said. Dr. Hjort, of Norway, and many other writers on Norwegian leprosy, think it to be the one great cause of the disease, while that eminent observer, Dr. Vandyke Carter, of Bombay, as stoutly denies it. It is certainly a fact that leprosy was originally a disease of the sea-coast, and to-day it is found in its most aggravated form among those people who are ichthyophagists in their habits, and especially eaters of putrid fish, as in Norway and Crete. Opposed to the acceptance of this diet as a cause is the existence of leprosy in districts where fish are never eaten, as in Central India, Persia, and Costa Rica; but here, it is argued, the disease was brought from the coast, and did not originate.

It may also be noted, in this connection, that the eating of fish was not forbidden by the Levitical law. (Leviticus, xi. 9.) Regarding the prolonged use of salted food as an attributed cause, it may be confidently stated that this arose from the confounding of scorbutic symptoms with those of leprosy, a mistake in diagnosis not unnatural.

If not a cause, however, we must agree that putrid food, faulty hygiene, and filthy habits aggravate the disease. In the case of the natives of the Hawaiian Islands, we can make no application of these enumerated causes of leprosy, with the single exception of diet, which consists largely of fish; but it must be remembered that for ages this has been the case without any evidence of leprosy being developed. Before the advent of foreigners their food consisted principally of raw fish raised with great care in artificial fish-ponds—but often eaten when very stale, if not putrid—shell-fish, and *poi*,\* to which may be added certain esculent sea-weeds, and the fruit of the cocoa-palm, while their clothing was scanty and their comforts few; yet leprosy was unknown. Since the period named, their diet and surroundings have been vastly improved; their bodies have been better clothed, they have been better housed, and surrounded by greater household comforts, while, in contrast with the simple diet of former days, we see every variety of meat, fruit, and vegetables added to their list of food, and obtainable by all, yet in the midst of all this plenty and comfort the dread disease takes hold of an entire race.

Climate, soil, hygienic and domestic conditions, and diet, acting through centuries, having produced no evidence of leprosy in the Hawaiian Islands, we must conclude, when its development coincides with no change in the geographical or topographical position of this people, and an improvement in all other conditions, that it is an imported disease, and can only admit that certain other maladies may have so affected the native constitution as to render it receptive of elephantiasis.

With the opening of the Hawaiian Islands to the commerce of the world, the various diseases of other countries were im-

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\*A preparation rich in starch and gluten obtained from the root of *Tarum esculentum*. It is an aquatic plant now extensively cultivated on overflowed lands known as *taro* patches.

ported. Syphilis was introduced by Cook's expedition, and was rapidly disseminated through the islands—principally by the licentious association of native females with the sailors of our American whaling fleet—so that to-day, it is said, "the great majority of the adult population is contaminated." Scarletina, influenza, measles, and small-pox, have also swept over the land as fearful epidemics, and slaughtered thousands. A syphilitic cachexia, or a debilitated constitution left by these various diseases, may have disposed this people to receive more readily the leprous poison, and it is certain that its rapid spread was coincident with a period following these epidemics.

The importation of leprosy into the Hawaiian Islands is usually connected with the coolie trade, which was inaugurated in 1840, and the first leper, Ahia, was recognized eight years later, in 1848, though not at that time as affected with true leprosy. The disease did not attract attention until many years later, in 1859, when at the Queen's Hospital, Honolulu, it was fully recognized as Elephantiasis Græcorum by Dr. Hillebrand, and the matter referred to the Hawaiian Government. Attention being called to the affection, many physicians remembered puzzling cases of eruptive disease as having occurred in their native practice for years, which were now considered to be leprosy, and the case of Ahia was brought to the attention of the profession. The date of this first case coinciding with the commencement of coolie immigration, there seems to be little doubt that the disease was imported from China, though an attempt has been made to trace it back to the old Portuguese voyagers. It has from the first been known among the natives as *Maipake*, or Chinese disease, but this may have had its suggestion in the peculiar facial expression belonging to leprosy.

The subsequent propagation of the disease was remarkably rapid, and its spread has been attributed to a combination of many circumstances.

Firstly (as mentioned before). A syphilitic or scrofulous cachexia, or a debilitated constitution rendering the race susceptible to the new disease. (Dr. Trousseau thinks this constitutional condition necessary.)

Secondly. Promiscuous and compulsory vaccination during several epidemics of small-pox, in which it was impossible to obtain vaccine virus of desired purity.

Thirdly. The notoriously licentious habits of the common people.

Fourthly. The absence of all fear or disgust of the disease, which affords no bar to ordinary association, cohabitation, or marriage.

Fifthly. The social habits of the people, viz, large families crowded together in small huts and sharing the same mats and blankets; the eating of *poi* with their fingers, all seated around and helping themselves from the same calabash; the drinking of *ava* in the Hawaiian manner; passing the pipe from mouth to mouth, a common Hawaiian custom and evidence of hospitality.

Sixthly. Hereditary transmission.

It may be here noted, in reference to the use of *ava*, referred to above, that it is the root of the *Piper methysticum*, and is extensively employed in these islands as a means of intoxication, its sale being licensed by the government. In the household it is prepared by chewing, after which process the masticated mass is placed in a calabash, the salivary infusion diluted with water, and served in cups of cocoanut-shell. Its action is that of a cerebral stimulant and narcotic, its prolonged use producing serious constitutional effects which have undoubtedly influenced the vitality of the Hawaiian race. It produces a white scaly eruption in those who drink it to excess, and various ophthalmic inflammations are attributed to it, so that some observers have endeavored to find in it a cause of leprosy. Besides its appre-

ciation for the purposes of intoxication, the natives view it as a medicinal panacea, and use it especially in venereal disease.

#### THE INHERITANCE OF LEPROSY.

The majority of observers agree that the inheritance of leprosy is the most important influence in its dissemination, and that it "will follow its prey to the last scion of the race."

There is every evidence that leprosy is hereditary in the Hawaiian Islands, but the subject of inheritance has not been long enough under study to determine the laws which govern it. In other countries it occasionally skips a generation, and it is likely to do so here; but it does not desert the race until some profound radical change takes place in the surroundings of the descendants, such as a new mode of life in every respect, or a change of climate.

Fortunately the female lepers of these islands are generally barren, only two births being reported in a population of two hundred during the first five years after the establishment of the leper settlement, one of which was still-born and the paternity of the other disputed. Where both parties to the marriage are lepers, the almost inevitable result is sterility, but when only one is affected, there is a greater likelihood of the relationship proving fruitful. Since 1872 three children have been born of leper parents, and fifteen where only one parent was affected. All survive (1876) and are at present free from any signs of leprosy. The heredity of leprosy is maintained by Drs. Danielssen and Boeck, of Norway, as well as by the writers on Cretan leprosy, but denied by Dr. Hjort; there is, however, no doubt that, where it prevails endemically, the disease is perpetuated by intermarriages. The statistics of Norwegian leprosy include an examination of 213 cases, of which 198 were pronounced hereditary; and in the island of Crete, of 122 lepers, 76 were considered to have inherited the disease.



In China the belief that leprosy is hereditary is universal. Marriages are never permitted with the progeny of lepers, and the appearance of leprosy in a family stops all matrimonial engagements.

#### THE CONTAGION OF LEPROSY.

Leprosy is not contagious, in the ordinary acceptation of the word, as we apply the term to variola, scarlatina, rubeola, and scabies. It requires an absolute inoculation of pus or blood into the circulation through open vessels or abraded surfaces,\* and, at the same time, it is assumed that we must have the cachetic condition favorable to the action of the virus.

The circumstances favoring this inoculation among the Hawaiians have been already recited, and are especially the passing of the pipe, and promiscuous eating from the same dish. No matter how fearfully ulcerated the lips or hands may be, around goes the pipe in the family, or in the extension of *aloha* to visitors, and the fingers are without compunction dipped in the universal calabash of *poi*. Any abraded surface of the lips is thus exposed to absorption, and in this way the inoculation is assumed to most commonly take place. Cohabitation is equally a cause of infection, the local conditions for absorption being the same. Vaccination, as previously stated, is also considered to be a means of inoculating the system with leprosy. It is also probable that the native itch, or *pupu*, may be an agent in the dissemination of leprosy, scabies being found by Dr. Hoegh to act in this manner in Norway.

Having determined that Elephantiasis Græcorum is a contagious disease, it is but proper that we should present the facts of which we are possessed in support of this assumption, and fortunately we are sufficiently supplied with such evidence.

The first recognized case in the Hawaiian Islands was that of Ahia, who lived a short distance from Honolulu. This case was

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\* Recently the excreta have been suggested as a medium of contagion.

first diagnosed in 1853, he being the only leper in the vicinity, and eight years later his neighbors and friends to a large number were found to be affected. In 1864, a government official, the only leper in the district of Kailua for years, was considered to have been the means of spreading leprosy through his neighborhood, where, at this date, many were found. In one instance a family, consisting of brother, sister, and niece, were affected, all between 14 and 35 years of age. Here, of course, no hereditary taint is admissible.

Dr. Hillebrand cites a case in Borneo where a white boy of European parentage was accustomed to play with a leprous child of color. On one occasion the native boy thrust a knife into an anæsthetic part of his body, which act was immediately repeated by the white lad with the same knife. The latter was soon after sent to Holland where he grew to maturity, and nineteen years later developed the disease, returning to Borneo a confirmed leper.

The dressers in the hospitals of Calcutta, and other portions of the East, positively free from hereditary disease, have in many instances developed it under circumstances connecting the inoculation with their duties; and Dr. Robertson, superintendent of the leper-house in the Seychelles Islands, became a leper during the period of his connection with the institution.

Among the lepers on Molokai the great majority point to some association with lepers as the source of their infection. In the examination of cases such answers as the following are most frequently returned to investigations as to the manner in which their disease was contracted, viz: "I married a leper woman." "My nurse was a leper." "I lived in the house with a brother-in-law who was a leper." "I was a prostitute and cohabited with lepers." "I lived five months in the house with a leper." "I used to visit, and both eat and smoke with lepers."

It would seem that leprosy may not develop itself in an infected

person if the individual lives under good hygienic conditions and is well nourished. The date of development is generally referred to some accident or exposure producing a powerful influence on the nutrition of the system. The effect of prolonged labor in the water under a tropical sun, while employed in fishing, is frequently referred to as the period of development. This being accepted as true explains those anomalous cases in the history of leprosy here, and elsewhere, in which the disease is said to be imparted by females who are unaffected, but in whom it is simply not active, and we have to assume the menstrual flow as conveying the materies morbi. A notable instance in Hawaiian leprosy illustrative of this point is that of the woman Moanalua, whose first husband developed leprosy two years after marriage, and died five years later. She then married his brother, who also developed the disease in two years and died at the end of six years. Her third husband was a healthy man from another island district, who likewise showed evidence of being a leper in two years and died in six years. The woman still survives and is apparently healthy. Another noticeable case is that of Komaea, a young native, aged twenty-five, who lived for five years with the widow of a leper, cohabiting with no one else, and not meeting or associating with lepers. At the end of this period the disease was fully developed and he was committed to Molokai, while the woman has as yet shown no signs of the disease. Dr. Perez, formerly of Honolulu, thinks that in these cases leprosy may remain latent and develop itself at the change of life.

In cases of immunity from contraction of leprosy in the relation of marriage, or prolonged cohabitation with a leper, it is assumed that the conditions of an abraded surface, and the contact of pus or blood with an absorbing surface have, by a happy succession of accidents, never taken place.

As regards the material of contagion, Dr. Trousseau thinks it

to be pus or blood transferred through the medium of the *poi* bowl, the *ara* cup, the pipe, and the habit of kissing, or rubbing noses, the *aloha* of these islands. In this connection, he states that he has seen many families in which every member had become affected with syphilis through a single case of syphilitic onychia, the infection being traceable to the calabash of *poi*.

It may be added that many East Indian surgeons reporting originally to the College of Physicians, of London, that leprosy was in their opinion non-contagious, have since reversed their verdict, so that its contagious character is now well established. That all are not agreed in the matter is probably due to the difficulty of obtaining reliable evidence in countries where the leper is shunned by every one. In the Hawaiian Islands no such fear is found among the natives, and abundant testimony to its contagious character is obtainable. Dr. Landre, of Surinam, gives twelve cases of European children who contracted the disease, their parents being perfectly free from all suspicion of it, being of the higher classes, and in easy circumstances. They could not have inherited it, but all were known to have come in contact with lepers.

#### THE ERADICATION OF LEPROSY.

The practical eradication of leprosy from Europe was effected, as we have seen, by the banishment of lepers from all association with their fellow-men, their civil death, and the committal of their spiritual and bodily welfare to the good brothers of the knightly order of St. Lazarus; and the result of this is that to-day Norway is the one single portion of modern Europe where leprosy exists as a fixed and widely extended feature of disease.

In these days we have nothing better to urge than this same segregation, practised with such success by mediæval Christendom, and from it we have reason to expect the same happy

result. This has been the advice of the Hawaiian physicians to their king, and no government could more perfectly, liberally, and humanely have carried out this idea than the legislature and board of health of this island nation of the Pacific.

In Norway and India this measure has been strongly advocated; but the Hawaiian Islands and China are at present the only countries in which segregation is enforced. In Norway Dr. Neumann states that the vas deferens of boys affected with leprosy is tied to prevent procreation, and in Scotland castration is performed. Either operation seems to be eminently proper, but would be difficult of enforcement in the Hawaiian Islands, while the prohibition of marriage among lepers, the propriety of which is likewise evident, would meet with equal opposition.

After the positive diagnosis of Elephantiasis Græcorum in 1859, cases became alarmingly frequent, so that in 1865 the presence of the disease, as well as its rapid increase, could no longer be overlooked, and legislation was demanded to save the native race from extinction. In this year the Hawaiian legislature passed "An act to prevent the spread of leprosy," its essential features being the gathering together of all lepers in the kingdom with a view to their treatment and segregation, and the carrying out of its provisions was left to the board of health, under the presidency of Dr. Hutchinson, then minister of the interior. The first act of the board was to establish the hospital of Kalihi, on the island of Oahu, near Honolulu, to which all suspected lepers were brought from the islands of the kingdom and subjected to a careful examination. None but those in whom the disease could be apparently diagnosed were retained, and many of these were subsequently discharged as non-lepers.

The second act of the board was to secure, by purchase, a portion of the island of Molokai as a leper settlement, where the

infected could be isolated; and here, after due preparation, the lepers were first transferred in the early part of January, 1866.

The following table represents the statistics of the Kalihi hospital and the settlement of Molokai from November, 1865, to April, 1872:

Whole number examined.....	1,288	
Discharged at once.....	570	
	<hr/>	
Whole number admitted.....		718
Discharged subsequently.....	145	
Afterward returned as lepers.....	7	
Sent to Molokai.....	529	
Died.....	29	
Ran away.....	5	
	<hr/>	718
Asylum at Molokai:		
At asylum March 31, 1870.....	269	
Sent from Kalihi since April 1, 1870.....	175	
Sent direct from other islands.....	13	
	<hr/>	457
Subsequently discharged as non-lepers.....	3	
Died.....	69	
	<hr/>	72
Remaining in settlement April 1, 1872.....		385

Subsequent to the report of 1872' it became apparent that the law had not been able, as had been supposed, to collect together those infected with the dread disease, but that all through the kingdom lepers were to be found, and especially in and around Honolulu and Lahaina. Public opinion demanded an enforcement of the law of 1865, and extraordinary measures were taken by the board to carry out its provisions; the result being that, from April, 1872, to April, 1874, nearly as many persons were submitted to examination as in the previous seven years of the existence of the law, and 451 undoubted lepers were

sent to Molokai, all natives or half whites, with the exception of one American, one Frenchman, and four Chinamen.

The king, Lunalillo, lent his active co-operation to the board, and Dr. Trousseau was very energetic in the good work. The latter, in a communication to the press, dated July 7, 1873, writes as follows:

"The number of lepers in Molokai being about 800, say a little over two per cent. of the native population, we may positively assert that there are not over 50 cases at large by this time. Some cases are sure to make their appearance for the next few years; but we are in hopes that, if we do not eradicate the disease altogether, we shall keep it under such control that it will cease to be a cause of depopulation of the native race."

The reports of commitment to Molokai since 1873 show the number of lepers at large to have been underestimated, and it will take many years of the same zealous labor as that of Dr. Trousseau and his associates to fulfill this happy prophecy.

From the biennial report of the board of health for 1876 we learn that the following commitments to Molokai have taken place since April 1, 1874:

Males.....	175
Females (including children) .....	122
	<hr/>
	297

And it is a singular fact that the deaths nearly correspond to the admissions, being:

Males.....	177
Females (including children) .....	122
	<hr/>
	299

During this period (1874-'76) the Kalihi hospital was abandoned, and a house of detention in Honolulu substituted for it, where all the suspected are detained until their condition is determined, and on being denounced as lepers are committed to Molokai.

A review of the reports of the board of health covering the period from 1868 to 1876 develops the following facts:

Admitted to Molokai from January 6, 1866, to March 31, 1876.....	1,570
Annual average.....	157
Deaths during same period .....	872
Average of mortality.....	87.2

It will thus be seen that the admissions during the last biennial period have been far in excess of the average, and the number of deaths even exceptionally great. For this mortality no explanation can be offered; but the excessive number of admissions is undoubtedly due to the energy displayed by the board of health in ferreting out the infected. In performing this duty every obstacle is thrown in its way by fond relatives who have no fear of the disease, and endeavor by every method to deceive the officers of the law and conceal the fact of leprosy being present in their families, in some cases caves being dug under their houses and huts or isolated dwellings prepared in the mountains as hiding places.

#### THE PATHOLOGY AND MORBID ANATOMY OF LEPROSY.

The essential pathology of leprosy is generally conceded to be a chronic inflammation in the course of the nerves, and a formation of a new tissue of a granular character in the affected parts, or around and within the nerves and nervous centers. In its anæsthetic form it is found more closely associated with the nervous system, and in the tubercular form with the integuments and mucous membranes. This new growth causes a fatty degeneration with absorption of the nervous tissue, and explains the anæsthesia, contraction of the fingers, and loss of vitality in the affected regions, shown in the waste of tissue, the dry, scaly integument, and loss of parts. There is also thickening of the subcutaneous veins and enlargement of the cervical glands.



The anatomical characteristics, as described by the Norwegian physicians Drs. Danielssen and Boeck, as well as Virchow and Carter, show a thickening of the neurilemma of the nerves and a separation of the fibrillæ by a dense cellular deposit, and a similar cell infiltration in the leprous tubercles and cutaneous papillæ. Although this chronic inflammation and microscopical appearance are invariably associated with Elephantiasis Græcorum, it must be acknowledged that they are not distinguishable from similar changes in Elephantiasis Arabum, lupus, and allied diseases; and that many eminent pathologists, including Virchow and Hebra, think the inflammation to be simply a symptom and association of leprosy, the distinguishing pathological feature of this disease remaining yet to be discovered.

The post-mortem appearances in tubercular cases show an involvement of the internal organs, save the lungs, and tubercular deposits in the mesenteric glands, with a similar deposit in and a thickening of the pleura and peritoneum. Ulceration of the bowels is also frequently noticed, and is associated with the fatal diarrhœa and dysentery. The changes in the nervous centers are not sufficiently distinct, uniform, or pathognomic to be enumerated.

#### TREATMENT.

No treatment has ever proved efficacious in the hands of the eminent gentlemen of these islands who have devoted their services to the subject of leprosy, and taken advantage of all observation and experience in other portions of the world similarly accursed. Arsenic is the one remedy which seems to be able to keep the disease in abeyance, and this, with tonics, good food, proper clothing, attention to hygienic surroundings, and proper dressings to ulcers, is all that is now attempted with the lepers of Molokai.

When fully developed, leprosy is, without doubt, incurable; but in the East Indies it is generally conceded that arsenic will

stop its progress if given at an early stage. It is there more often administered in the form of yellow sulphide (orpiment), combined with what is known as the extract of neem. Morgra oil is rubbed into the skin at the same time. Gurjun oil, a product of the *dipterocarpus turbinatus*, and similar to the oil of copaiba, is also extensively used, and has been favorably reported on from Jamaica and India. It is used internally, and as a liniment combined with aqua calcis. In many cases ulcers healed, the tubercular condition was overcome, and sensibility returned to anæsthetic parts, but whether the result was permanent has not yet been determined. It seems, however, to be our best addition to the materia medica of Elephantiasis Græcorum. Macnamara mentions among East Indian remedies the powdered root of the mudar (*Asclepius gigantea*), combined with mercury, for internal administration, while poultices of the *Hydrocotyle Asiatica* are applied to the ulcerated surfaces. Dr. Hillebrand, of Honolulu, speaks favorably of argenti nitras internally as a tonic and alterative, which in his hands had controlled the disease for a limited period. What is known as Beaupertly's treatment consists in the local application of the cashew nut, good diet, and mercury in alterative doses. It has been extensively tried, and only to be condemned. At Bergen the iodides with purgatives are said to do some good in the early stages—a general experience in the treatment of leprosy—and, at the same time, cups and moxas are applied to the spine with benefit to the nervous symptoms.

The Hawaiian Government is frequently called upon to consider the propriety of purchasing secret remedies or professional services, to be employed in an attempted cure of leprosy. In 1874, \$6,000 were appropriated for this purpose, and Drs. Powell and Akana were offered every facility to test their remedies at Molokai. Dr. Powell declined to serve; but Dr. Akana, a Chinese physician, went to the leper settlement, and

for six months had the exclusive care of six patients, none of whom were cured, and only one was benefited. The latter was claimed as a cure, but has since been committed to Molokai as a confirmed leper. The native *kahunas* pretend to have vegetable remedies which will cure the disease, and many intelligent Hawaiians, as recently stated in the legislature, believe their claim to be well founded. These *kahunas* are a class of witches, or sorcerers, corresponding in some degree to the medicine-men of our American Indian tribes. They are licensed to practise in districts where otherwise the natives would receive no medical treatment, on condition of using only simple remedies and avoiding sorcery. They practise, however, illicitly throughout the kingdom, and the natives have generally the most implicit faith in their mummeries and incantations. Recently a *kahuna* claimed to have discovered a cure for leprosy which his wife had submitted to, and recovered (?). His method was to smear coal-oil over the affected surfaces and ignite it.

The natives, in this disease, as in syphilis, make extensive use of *ava* (*Piper methysticum*) as a remedy, which is considered by the profession to be of no use, and sometimes productive of positive harm.

#### THE LEPER SETTLEMENT OF MOLOKAI.

No asylum dedicated to the purpose of isolating infected human beings could be more perfectly located than the leper settlement of Molokai. It is situated on the northern side of the island, in a narrow valley representing the crater of an extinct volcano, compassed on one side by a precipitous *pali* or precipice 2,000 feet in height, and on the other by the sea, two barriers which render the isolation of the settlement complete. Its situation exposes it to the constant action of the northeast trades which search every corner, and temper the extreme heat of summer, rendering the days unoppressive and the nights delightfully cool.

The land comprised in the settlement is about 1,600 acres of volcanic soil, full of rocks and bowlders, a large portion of which has been by diligent labor prepared for cultivation. At the eastern extremity a brawling stream empties itself through a wild ravine into the sea, and furnishes an abundant supply of water, distributed through the settlement by means of pipes. In its vicinity are located the government *taro* patches—the cultivation of this esculent root requiring an abundant supply of water—which produce more than a sufficiency for the use of the lepers, and the sale of the surplus affords a small revenue.

There are few trees in the settlement, on account of the constantly blowing saline breezes, but here and there in sheltered situations we find them, and at the foot of the *pali*, in the centre of the valley, is a volcanic cone within which is a salt-lake, and, clinging to its sides, a luxuriant growth of *kukui* trees.

Various buildings are scattered over the length and breadth of the government domain, but at certain points there is a tendency to concentrate into villages or hamlets, and these have received various designations.

The port, and most western village, is known as Kaluapapa. Here there is, besides dwellings of the lepers, a small Catholic chapel. A mile further on we find another collection of houses around a pretty cottage occupied by Peter Young Kaeo, a chief and relative of Queen Emma. This receives the designation of Makanalua. Another mile brings us to Bola-bola, the residence of the superintendent, Mr. W. P. Ragsdale, and also the location of the village store and hospital. A half mile further and we come to Kawalalo, the most populous of the hamlets, and site of the Catholic and Protestant churches, while just beyond we have a picturesque mountain gorge designated as Kalawao, a name frequently applied to the whole settlement, and the *taro* patches of Wiakolu. The precipice which forms

the southern boundary is known as the Pali of Ili-ili-kāā, or the precipice of rolling pebbles.

The number of houses in the settlement is about 230. Those occupied by the lepers are neat structures of wood or native grass huts, and surrounded by cultivated patches of land where bananas, plantains, yams, pine-apples, and melons are raised in abundance. The dwelling of the superintendent is a small but pretty cottage of one story, surrounded with broad verandas and comfortably furnished. It is placed in the centre of a large enclosure, with detached kitchen, servants' quarters, and stable. Near by is the store, and closely adjacent the hospital, a series of whitewashed cottages within ample grounds and surrounded by a neat fence. The Protestant church is a plain structure without ornament, while the Catholic church is an ornamental though diminutive edifice, in which some attention is paid to ecclesiastical architecture and an attempt made at decoration, both within and without. It is entirely the work of Father Damien, the parish priest, a devoted and self-sacrificing Belgian, who has consecrated his life to these unfortunate people. His missionary preparation made him a good carpenter, and he not only built his own church and the chapel at Kaluapapa, but the comfortable dwellings now occupied by the lepers, in the building of which he was both superintendent and assistant, the board supplying only the nails and lumber.

Near by the church is a Catholic cemetery arranged by Father Damien, where, to save expensive and laborious excavation of the soil, the dead are, as it were, buried above ground, a mound of cement being raised over their remains. This, when whitewashed, receives an inscription, and serves all the purposes of a tomb.

The hospital grounds contain five ward buildings, a cook-house, dispensary, and office, store-house, six cottages for em-

ployés, and one for extremely bad cases of the disease. They are thoroughly cleansed daily, have a weekly scrubbing, and are whitewashed within and without every three months. In the hospital were found thirty-two patients, some of them extremely bad cases, but the majority by no means worse than many at large in their own homes. They were here on account of their age, or because of being without relatives or friends to give them proper attention in their maimed condition.

Each cottage constituting a ward is well ventilated by means of numerous windows, and kept scrupulously clean through frequent whitewashing and scrubbing. The bedding supplied consists simply of a mat and blanket, easily cleansed, but non-absorbent mattresses or pillows are issued, and to this is probably due, in some degree, that comparative freedom from offensive odor which surprises us in apartments occupied by patients affected by this vilest of diseases.

There is no physician resident on the island, and medical attendance is confined to the monthly visits of Dr. Enders, acting as "traveling physician" for the board of health, who is represented in the interval by an apothecary. The latter has a supply of sulphate of magnesia and iodide of potassium, which, with cathartic pills and an expectorant for general use, are made to fulfill the necessities of internal medicine, while for external use he prepares various ointments, especially one of sulphur. In this connection it may be stated that the board of health, after long experiment, has come to the conclusion that leprosy is incurable, and that there is but little to do beyond dressing ulcerated surfaces and assisting the ordinary functions of the body; but it is, nevertheless, desirable that there should be a resident physician to embrace the great opportunity here offered of studying leprosy and treating such intercurrent disease as may arise.

In June, 1876, there were 845 inhabitants at the leper settle-

ment, of which 686 were lepers and 159 non-lepers, comprising 75 males and 84 females. The non-lepers consist of those residing here at the time the land was purchased by the Hawaiian Government and who elected to remain in their old homes, as well as wives, husbands, and children of lepers who were at first permitted to thus exile themselves, a privilege no longer granted.

No pen can describe adequately the horrible deformity of these outcasts, with their features and limbs distorted by the various processes of the disease. We may find the face of a shining coppery hue; eye brows and lashes gone; conjunctivitis, with great congestion, and eversion of the lids, uncovering the eyes, sightless, perhaps, from corneal opacity; tubercular swelling and ulceration of the lips, cheeks, and ala of the nose, with loss of the septum and flattening of this organ; enlargement of the ear lobes; tubercular ulceration of the tongue, fauces, larynx, and posterior nares, producing nasal discharges, fetid breath, and feeble, croaking voice, while the general cutaneous surface will be thickened and rugose, or may be a mass of tubercular ulceration, and the fingers or toes represented by a series of phalangeal stumps, standing at every angle on the metacarpus or metatarsus.

Yet these people are not sufferers in any acceptance of the term—the anæsthetic character of the disease in most cases preventing this—but are, on the contrary, happy. They employ themselves in gardening, fishing, and the care of their poultry and pigs; they have their horses and their cows, and the board provides them with comfortable dwellings, good clothing, and all the *poi*, meat, and dried fish they desire, while they enjoy complete exemption from all taxation. These numerous advantages, with perfect freedom from all care for the morrow, are soon appreciated, and there is but little discontent ever manifested among them. They are

great smokers and gossips, and are generally found assembled in front of their dwellings, squatted on the ground or upon mats, indulging in their declamatory style of conversation, and passing around the little wooden pipe with a brass mouth-piece, already mentioned as a means of spreading contagion. They are exceedingly fond of dress, which usually shows itself with the females in the acquisition of a gaudy hat; and on gala days they are seen, both men and women, dashing around the settlement on horseback, dressed in all the finery of which they are possessed, to which is always added a *lei*\* composed of bright flowers or fragrant leaves of the *maile*. They are also fond of dancing, and the native *hula-hula* is enjoyed here as much as elsewhere; while for those of the better class who wish to indulge in the more modern school of dancing, there is an opportunity afforded at a weekly hop given by an unfortunate female leper, a lady of good family and fashionable education.

The band is an institution of the settlement and makes a very creditable appearance in its gay uniform, and bearing the Hawaiian standard. It was organized some years since by a leper having considerable musical culture, and since his decease the organization has been maintained. It is really wonderful, the sweet music they produce, when it is considered that their only instruments are tin flageolets, originally intended for toys, and a couple of drums; but a true soul for music possessed by nearly all Hawaiians has enabled them to rise superior to their rude instruments, and interpret the simple native airs most acceptably. Many of them sing in chorus, accompanied by the others, their voices, modified by the disease, having a most peculiar, weird-like sound; and associated with their deformities of face and hands, as well as their peculiar instruments, their performance is indeed unique and sad. The band performs on all holidays, when any distinguished guests visit the island, and

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\* Necklace.



at funerals, as well as at the Catholic church festivals. At funerals it is the invariable concomitant, the last wish of the dying being often for this attention, the payment for its services taking precedence, in the testator's mind, of all legacies.

Governor W. P. Ragsdale, usually known as Bill Ragsdale, is the resident governor, who voluntarily exiled himself to Molo-kai on discovering himself to be a leper. He is a half white, his father an American of ability, a lawyer by profession, and a man of more than ordinary culture. Before his voluntary exile he was a companion of the present king, a lawyer noted for his wit and legal attainments, but especially for his thorough conception of the Hawaiian and English idiom, which rendered his services as interpreter to the legislature beyond price. In this particular he is said to have had no equal in the Hawaiian Islands. His relation to the people is that of a chief, and he rules them in a truly patriarchal manner, though the right of appeal to the board is always recognized, and occasionally insisted on, or even an appeal to the legislature. This latter right was exercised during our visit, and a legislative committee came down to investigate the complaints, which emanated principally from the better class, socially, of lepers. Their complaints were that the place was unhealthy, too cold and windy, and their food often not edible, especially the *taro*, which was served to them when decomposed. The conclusion of the committee was that their complaints were frivolous, and an eloquent rebuke was administered by Governor Ragsdale to the malcontents, as well as to those who oppose segregation—not believing in contagion—and think the leper settlement should be broken up. The governor epitomised the history of leprosy among his people, and feelingly referred to his own case and condition, declaring that all who doubted that the disease was contagious were dreamers, and that any one who would be willing to return to his home

and spread the foul contagion among his friends and countrymen, was worse than a traitor to the Hawaiian nation.

The board of health is represented by an agent, Mr. R. W. Meyer, who lives on the highlands of Molokai, above the *pali*, but makes a weekly visit to the settlement for the purpose of conferring with Governor Ragsdale. He is a highly cultivated German, of a truly philanthropic character, and, like Governor Ragsdale, takes a paternal interest in all that relates to the well-being of the lepers.

Governor Ragsdale's duties are those of a general superintendent and justice; that is, he administers the law in minor cases, and sees that his people are well housed, fed, and clothed, general order maintained, the sick cared for, and the dead buried. He also has charge of the cultivation of *taro*, and supervises the store, which is stocked with goods provided by the board.

Every leper receives weekly twenty-one pounds of *paiai*\* and six pounds of beef; but if these cannot be obtained, nine pounds of rice and three pounds of pickled salmon are served instead, with one pound of sugar. For the hospital, tea, milk, eggs, rice, beef, fish, and arrowroot are added to the ordinary ration, when necessary. No wine or liquors are allowed.

The clothing provided by the board is issued in the month of November of each year, and consists of one blanket, with an order on the store for four dollars' worth of goods. All the lepers are in receipt of considerable money from their friends, as well as from the charitable throughout the kingdom, and presents of money, food, and clothing are received by every trip of the government schooner. During the years 1874 and

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\**Paiai* (hard *taro*). The condition after its first pounding, in which state it is issued. When desired for use, a portion of it is placed in a calabash and mixed with water, when it is termed *poi*.

1875, \$3,000 was sent directly to individual lepers, by their relatives.

The store was established for the purpose of supplying many little private wants of the lepers, and is self-supporting. The lepers can buy goods in the store at cost price, increased only by a small percentage to cover the expenses of carriage and store-keeper's salary.

The officials of the settlement are as follows, with their annual salaries, viz :

Superintendent, \$500, and 5 per cent. on each bundle of paiai raised, amounting to \$750.

Store-keeper and clerks (3), \$35 per month for all.

Policemen (5), \$2 to \$4 each per month.

Vaquero, \$6 and no rations per month.

Herdsmen, \$1 per month.

Carman, \$5 per month.

Butcher, \$4 per month.

Luna or overseer (2), \$5 and \$7 per month.

Apothecary, \$10 per month.

Hospital cook, \$7 per month.

The annual expenditures amount to about \$28,000.

There are in the settlement 500 head of cattle, mostly belonging to the lepers, and 250 horses, of which only 17 belong to the board, a number of animals disproportionate to the grazing capacity of the pasture land. The beef cattle for slaughtering are brought from Hawaii or the highlands of Molokai.

Education is not forgotten among these poor outcasts, but instruction in the ordinary branches of learning is provided for the young, and religious teaching for both Protestant and Catholic children. At present the Protestant church of the Hawaiian Evangelical Association is without a pastor, its former clergyman, a leper, having died in the early part of June, 1876. Practical Christianity is, however, most ably represented in the

person of Father Damien, the Roman Catholic priest, a young man in all the freshness of youth, who has voluntarily exiled himself for the spiritual benefit of this afflicted people, and with but little save his own willing heart and hands has here "built a church unto the Lord," and made himself a friend unto all who are in trouble, irrespective of religion. He is priest, physician, nurse, carpenter, and agriculturist by turns, helping all in any way that is within his ability; always cheerful, always industrious, forgetting, in doing good to others, his banishment from society and its comforts.

It will thus be seen that the lepers of Molokai are not a suffering people; but, cared for with a wise humanity which redounds to the credit of the nation, are both comfortable and happy. They certainly are better off than the majority would be in their own homes; and here every necessity of life, as interpreted by the Hawaiian, is supplied with liberality; while the hygienic surroundings of the lepers are vastly improved, the very position of the settlement rendering it a perfect sanitarium. With good houses, plenty of clothing, an abundance of nutritious food, hospital comforts in times of suffering, and with educational and spiritual advantages, it must be acknowledged that little more could be asked for of a paternal government.

In concluding this attempted sketch of leprosy as at present existing in the Hawaiian Islands, with a description of the leper settlement of Molokai, I have to acknowledge the great kindness of Hon. S. G. Wilder, agent of the board of health, Governor W. P. Ragsdale, and Mr. R. W. Meyer; while for medical information, I wish gratefully to express my indebtedness to Dr. R. McKibben, Dr. J. S. McGrew, Dr. E. Hoffman, and Dr. Hillebrand (through his writings), but especially to Dr. G. Trousseau, who has given the subject of leprosy, while connected with the board of health, most earnest study, and kindly placed his valuable memoranda at my disposal.

## AN ACT to prevent the spread of leprosy.

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1. The minister of the interior, acting as president of the board of health, is hereby expressly authorized, with the approval of the said board, to reserve and set apart any land, or portion of land, now owned by the government, for a site, or sites, of an establishment, or establishments, to secure the isolation and seclusion of such leprous persons, as in the opinion of the board of health, or its agents, may, by being at large, cause the spread of leprosy. (1861, p. 62.)

2. The minister of the interior, as president of the board of health, and acting with the approval of the said board, may acquire, for the purpose stated in the preceding section, by purchase, or exchange, any piece or pieces, parcel or parcels, of land, which may seem better adapted to the use of lepers than any land owned by the government.

3. The board of health, or its agents, are authorized and empowered to cause to be isolated and confined in some place or places for that purpose provided, all leprous patients who shall be deemed capable of spreading the disease of leprosy; and it shall be the duty of every police and district justice, when properly applied to for that purpose by the board of health, or its

authorized agents, to cause to be arrested and delivered to the board of health, or its agents, any person alleged to be a leper, within the jurisdiction of such police or district justice; and it shall be the duty of the marshal of the Hawaiian Islands, and his deputies, and of the police officers, to assist in securing the conveyance of any person so arrested to such place as the board of health, or its agents, may direct, in order that such person may be subjected to medical inspection, and thereafter to assist in removing such person to a place of treatment, or isolation, if so required by the agents of the board of health.

4. The board of health is authorized to make such arrangements for the establishment of a hospital, or the securing of a ward in some hospital, where leprous patients in the incipient stages may be treated in order to attempt a cure; and the said board, and its agents, shall have full power to discharge all such patients as it shall deem cured, and to send to a place of isolation, contemplated in sections 1 and 2 of this act, all such patients as shall be considered incurable, or capable of spreading the disease of leprosy.

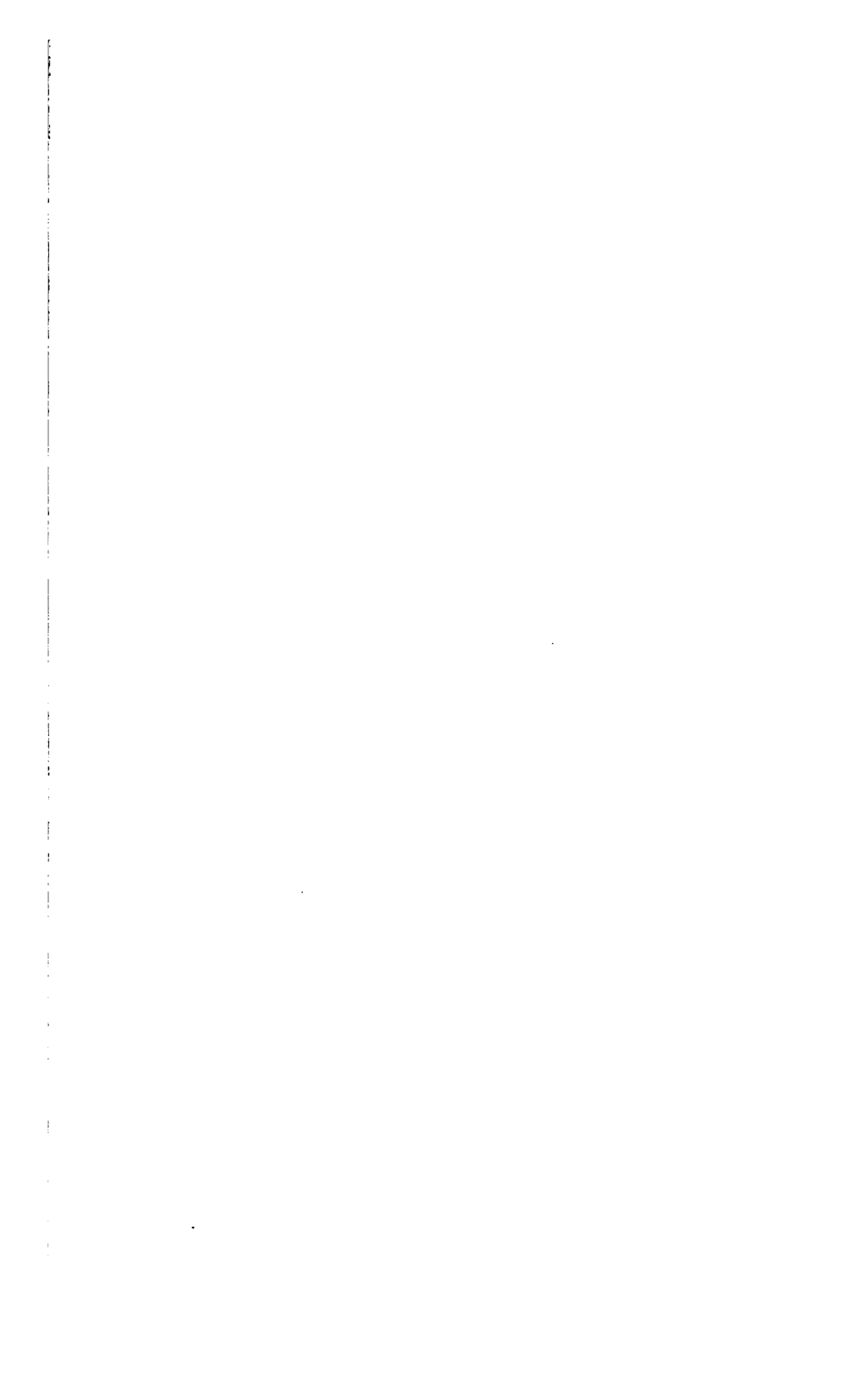
5. The board of health, or its agents, may require from patients such reasonable amount of labor as may be approved by the attending physicians; and may further make and publish such rules and regulations as by the said board may be considered adapted to ameliorate the condition of lepers, which said rules and regulations shall be published and enforced as in the 284th and 285th sections of the civil code provided.

6. The property of all persons committed to the care of the board of health, for the reasons above stated, shall be liable for the expenses attending their confinement; and the attorney-general shall institute suits for the recovery of the same when requested to do so by the president of the board of health.

7. The board of health, while keeping an accurate and detailed account of all sums of money expended by them out of

any appropriation which may be made by the legislature, shall keep the account of sums expended for the leprosy, distinct from the general account; and the said board shall report to the legislature at each of the regular sessions, the said expenditures in detail, together with such information regarding the disease of leprosy, as well as the public health generally, as it may deem to be of interest to the public.

The board of health is appointed by the king, in privy council, and consists of two ministers—the minister of the interior being its president—two physicians, and a business agent.





## PLAGUE.

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REPORTED BY JOHN C. WISE, M. D.,  
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As explained in the following report on the plague, this disease has recently attracted much attention among medical men and prominent officials.

Sanitarians sent to the seat of epidemics, have studied the history of the disease with greater care and advantage than hitherto, and free discussion has elucidated obscure questions in this regard. It is the recent knowledge thus obtained that I will endeavor to succinctly embody in this paper.

In view of the steady march of this malady from the further Orient, and the renewed attention it has received from medical men, at the same time eliciting the grave consideration of European Governments, I deem it worthy of report to the Bureau.

Lying dormant during the heat of summer, the plague seems to gather strength for an epidemic outbreak in the spring, fall, or winter; thus, from its original source, it has invaded the Arabian tribes of Mesopotamia and Persia; following the course of the Tigris and Euphrates it has advanced among the Turkish possessions in Asia, creating much anxiety lest Europe itself should become an habitat of this increasing scourge.

When we reflect on the commercial relations existing between Asia and Europe, we at once perceive the care necessary to prevent the spread of the plague. Thus the inland trade of Russia and Turkey, and England's extensive commerce on the

shores of the Persian Gulf may be the means of inflicting serious injury, not only to the countries mentioned but their neighbors.

Austria, acting in the initiative, represented this state of affairs by a memorandum to the Sublime Porte, the outgrowth of which was the appointment of a commission, with power to investigate the progress and recommend measures best calculated to arrest the advance of the disease. To give the work of this commission would unnecessarily extend the limits of this paper. Substantially it advised to send competent medical men to the diseased districts, whose duty it should be to signal new outbreaks; to thoroughly disinfect localities suffering from the plague, by means of whitewashing, fumigation, aeration, and, if necessary, the destruction of dwellings and property. In case of a tendency to extension a *cordon sanitaire* should be established, so that none escape disinfection. The existence of an epidemic being established, the province should be subjected to rigorous quarantine, by land and sea; the quarantine for persons being fifteen full days, and the same for merchandise and shipping. During an epidemic the Ottoman Government should abstain from levying troops in the affected districts. The medical officer should make a careful study of the disease, its course, symptoms, and means of propagation, and report on such subjects to competent authority. The local authorities to tender the medical officers and sanitary agents due aid in the exercise of their functions, such as furnishing troops and maintaining order in the lazaretto.

To the credit of the Ottoman Government be it said that they not only adopted these wise recommendations, but have put them in operation wherever practicable.

I now propose to briefly sketch the history of the disease.

The plague is inaugurated with a chill, though this is seldom seen by the medical observer, which doubtless accounts for the statement of some authorities that it is a fever which commences

the morbid manifestations. Simultaneously with the access, or a few hours later, there is a tumefaction of the lymphatic glands of the groins, axillæ, and neck; according to Colvill (Report on the pest in Mesopotamia, 1875), there are no genuine cases in which these lesions do not occur. The glands of the groin are first to swell, afterward those of the axillæ, while those of the neck are seldom so far advanced; ordinarily the glands of one side only inflame, it being not one gland alone which is involved, but usually the whole chain, one being, however, larger than the others, round or oval in shape, and the size of a pigeon's egg; these swellings disappear by resolution, or, suppurating, leave a large cicatrix; petechiæ are often encountered in severe cases. Tholozan (Lettre adressé à l'Académie des Sciences de Paris, Bagdad, 1877), mentions the occurrence of a blackish eruption which invariably eventuates in death. In some epidemics the appearance of pustules, *boutons*, or *charbon* is constant, though they are not considered as essential anatomical characters. Colvill noticed them but seldom in 1875. The chill and fever are followed by sharp pains in the groins, axillæ, and neck, and also headache; the invalid appears listless and desires to be alone; during the fever there is an air of stupor, questions being answered by signs; the eyes are red and turgid; the tongue is tumid, generally brown or black, sometimes white or yellow and fissured; the teeth and gums are invariably covered with sordes; thirst is intense, and the patient sometimes complains of a lancinating pain in the stomach; Colvill observed vomiting in some cases, which was sometimes sanguinolent. Beck (l'Épidémie de Peste à Bagdad, 1876), states bloody vomiting to be a common symptom; these discrepancies are doubtless due to differences in the type of the epidemics.

During the fever the respiration is hurried and the pulse rapid. The urine, natural at the outset, becomes pale and

abundant, toward the end sanguinolent; the urea is augmented and the chlorides diminished. Constipation is persistent; diarrhœa is considered a favorable omen. After defervescence the patient perspires freely, and regains his intelligence somewhat, though remaining quite feeble.

The length of the disease varies greatly, often proving fatal in two days, or continuing in favorable cases to eight or nine days. Convalescence is often very tedious. It seems that much confusion has arisen in the diagnosis of the disease. Wilb, a Russian surgeon, serving with the army in Wallachia in 1826, was reprimanded by the Emperor for favoring an outbreak of the plague among the principalities of the Danube by not adopting quarantine regulations. This officer has since written much on the subject, and maintains that the disease appearing among and decimating the Russian army was not the plague, but an affection *sui generis* of paludal origin, marked by a bubonic fever. This he proposed to call "mal de Valachie." Whatever may be the merits of the case, certain it is, that Dr. Castaldi ("Rapport adressé au Conseil Supérieur de Santé à Constantinople") has established the occurrence of malarial fever, accompanied by buboes, on the banks of the Danube; it is proper to add, however, that Griesinger, an eminent authority, and also Hirsch (*Pathologie Historico-Géographique*, tome 1, page 208) do not accept this as a peculiar disease. At this time (February, 1878), an epidemic disease has appeared at Fratesti, a Danubian village, among the Turkish prisoners, and extending to the Russian soldiery, has created much alarm, but it is an importation from the East.

Beck, who has worked daily with the blood and pus of this disease, under the microscope, denies its contagion. He further infected cats and dogs, subcutaneously, with blood and pus, without obtaining any other result than local irritation. The preference which the disease manifests for low and marshy dis-

tricts, such as those bordering the Tigris and Euphrates, in the opinion of the author just quoted, points to a miasmatic origin. The writings of Colvill support this view. Tholozan and the mass of authority acknowledge a spontaneous origin, believing, at the same time, that the disease is often propagated by contagion.

The mortality varies greatly. Beck places the death-rate at 40 per cent., and according to the same authority the cases in which quinine was administered died at the rate of 10 per cent. Colvill's experience shows a wide range of mortality; in an epidemic occurring at the village of Chimfirt, in Mesopotamia, the death-rate was as low as 14 per cent., while he records another instance where so large a percentage as 95 died.

The blackish and petechial eruptions are precursors of a fatal issue, while the occurrence of diarrhœa and decline of fever from day to day are most favorable prognostications. If the patient survive until the twelfth day, he is considered out of danger.

The plague is a constitutional disease in which the blood contains a poison, most likely of malarial origin, the most essential feature of the disease being an enlargement and inflammation of the lymphatic glands of the groin, axillæ, and neck. The microscope reveals a diminution of the red corpuscles, the presence of black pigment, and hæmatine in the form of irregular black and brown fragments.

The most successful treatment is nutritive and tonic. Beck claims that the cinchona alkaloids have as specific an action in this disease as in those of acknowledged malarial origin.

For the eradication of the plague it is advisable to destroy tenements in low districts and to remove their inhabitants to higher localities. Under the old system of quarantine, according to M. Colin (*Dictionnaire Encyclopédique des Sciences Médicales*), the doomed village was surrounded by a cordon of troops, who fired on all attempting to escape; the inhabitants were confined

to the houses, and in the streets were only to be seen those charged with provisioning the prisoners, they receiving their food by baskets lowered from the windows. At this time more enlightened views exist on the subject. The inhabitants, instead of being confined to the diseased quarter, evacuate it at once. A *cordon sanitaire* surrounds the village to prevent ingress rather than egress, and confine the inhabitants to higher and healthier homes, while their old ones are disinfected or destroyed, as the circumstances demand.

Constantinople, the capital of the Turkish Empire, is renowned for the beauty of its situation, and its unsurpassed facilities as a commercial centre. The foundation of the city is of very remote date, an old Byzantine chronicle attributing the choice of its site to Apollo himself.

The Golden Horn, joining the Bosphorus at almost a right angle, forms two peninsulas; on the southern is built Stamboul, which includes ancient Byzance, and on the northern, are the comparatively modern settlements of Pera and Galata.

The peninsula on which Stamboul is located consists of undulating hills, not continuous with the mountains of the interior, but separated by a basin, which also defines the geological formation peculiar to this side of the Bosphorus, Marmora, and Dardanelles. The dwellings of Stamboul are small, badly constructed, and crowded; the building-material is wood, though Phanar (the Greek quarter) furnishes many exceptions; the streets are narrow, and where paving exists, it is so irregular as to contribute to the collection of filth. No system of sewerage exists, other than that provided by nature in the rapidly-flowing currents of the Bosphorus, which surround the city for two-thirds of its circumference, and into which the refuse is swept from the inclination of the streets. This natural system is not sufficient, and decomposing matter collects, filling the air with noxious gases. Dogs serve a useful purpose by removing

organic matter, which would otherwise be left to decay. Large cemeteries in and about the city contribute to the salubrity by the forests of cypress they contain.

Pera and Galata, located on the northern peninsula, are superior to Stamboul in construction and cleanliness; more especially is this true of Pera, which is built on high ground. In these towns there is an artificial system of sewerage, and an ordinance provides for widening some of the streets by setting back new buildings. The Christian element occupies this side of the Horn, thus accounting for its superior sanitary condition, which, however, is only good by comparison. Fires are unusually frequent in Constantinople, and form a potent factor in the purification of the atmosphere. These are due to the prevalence of wooden dwellings and primitive means of heating.

Climate is variable though not extreme; the difference between the mean temperature of the summer and winter months in 1874 was  $54^{\circ}$  Fah.; the mean annual temperature from 1871 to 1874 inclusive was  $58^{\circ}.3$  Fah. The lowest mean monthly temperature for the year 1874 occurred in February, and was  $37^{\circ}.7$  Fah.; the highest mean monthly of the same year occurred in August, and was  $72^{\circ}.8$  Fah.

It has happened in exceptionally cold winters that the Bosphorus has frozen over, but such a condition must be of short duration, for the rapidly flowing currents would soon carry off the ice. Reclus (*Nouvelle Géographie Universelle*) records, however, that in the year 762 A. D. icebergs were so numerous as to form a glacial sea in the Dardanelles and completely obstruct its passage. Two important elements in the climate of Constantinople are, first, its intermediate position between the Black and Ægean Seas, serving to mitigate the rigors of winter and generally equalize the temperature; secondly, the cold winds from the steppes of Russia enter the northern end of the Bosphorus, and, gathering increased strength in its narrow con-

finer, sweep down upon the city with tremendous velocity. These winds are not accompanied by clear and cold weather, but with clouds and rain or snow.

It will be seen from the accompanying tables to what extent the northerly winds prevail. In 1873 they occurred 141, and in 1874, 105 days more frequently than southerly winds.

In the year 1874 there were 82 rainy days, and the rainfall was 19.89 inches; this is, however, smaller than the average rainfall, which for the years 1871, '72, '73, '74, averaged 25.16 inches—about that of London.

The following observations are compiled from those of M. Coumbray, director of "l'Observatoire Impérial," Constantinople:

*Meteorological tables comparing years from 1871 to 1874, inclusive.*

Temperature, etc.	1871.	1872.	1873.	1874.
Mean annual temperature .....	57.6	59.36	58.82	57.38
Maximum annual temperature .....		87	87.24	92.48
Minimum annual temperature .....		30	28.93	25.98
Number of rainy and snowy days .....				82
Wind from N. E. to N. W. ....			253	225
Wind from S. E. to S. W. ....			112	130

*Meteorological table for 1874.*

1874.*	Mean monthly barometer.	Mean monthly thermometer.	Mean relative humidity.	Rain and snow, No. of days.
January .....	30.21	39.7	81	6
February .....	30.10	37.7		13
March .....	30.10	39.5	79	17
April .....	29.88	55.5	71	4
May .....	29.89	61.8	64	9
June .....	29.99	68.7	67	3
July .....	30.15	72.6	63	
August .....	29.90	72.8	63	
September .....	30.05	68.9	63	2
October .....	29.89	62.3	73	5
November .....	29.89	54.1	73	12
December .....	29.94	53.4	77	11

\* The rainfall for this year is much below the average.

Since the time of the Emperor Justinian, Constantinople has been supplied with water from springs in the forest of Belgrade,



about twenty miles north of the city. The water is preserved in large reservoirs, where it often becomes quite muddy after heavy rains, and there seems to be no good means of filtration; with this exception it seems to be of fair quality.

The shipping is generally supplied with spring-water from Beicos, a village on the Asiatic shore of the Bosphorus; if seen uncontaminated by dirty water-pipes or boats, this water is beautifully clear and very pleasant to the taste; it contains too much lime carbonate, but is in all other respects excellent water; indeed, it is celebrated on both shores of the Bosphorus. The inhabitants say no one was ever made sick by this water.

In this connection I will mention the thermal springs of Brousa, which are of much repute for their healing powers. This town, the capital of ancient Bithynia, lies about twenty miles distant from Mudaina, a port on the Sea of Marmora. The important springs are Yeni-Koplidja and Kara Moustopa.

The waters of the latter have a temperature of  $57^{\circ}$  centigrade; they are deficient in fixed and gaseous substances. They are said to resemble the waters of Wilbad and Terplitz. They are recommended in the treatment of chronic rheumatism, and to the nervous and delicate, who could not support the stronger waters of Kukurtlu and Yeni-Koplidja. For chronic gout, diseases of the nervous and nutritive systems, Yeni-Koplidja and Kukurtlu are said to have properties analogous to those of Baden. Yeni-Koplidja has a temperature of  $86^{\circ}$  centigrade, and Kukurtlu  $82^{\circ}$  centigrade. The latter are the only baths fitted up with any comfort, the others being furnished with the most primitive conveniences. These springs are resorted to by those suffering from chronic laryngitis, chronic rheumatism and bronchitis, the chronic forms of uterine diseases, and obstinate skin diseases.

I find that as long ago as 1848 an American chemist, Mr. Smith, studied the chemical composition of the thermal waters of Brousa.

Owing to the prejudice of the Turkish people against being numbered, statistics are difficult to obtain, and then are unreliable. The population of Constantinople as given by Saxe is 600,000—400,000 Christians and 200,000 Mussulmans. The Christian element embraces more varieties than any city in the world.

Burial permits are given by irresponsible parties, so that the number of deaths occurring is also uncertain. The mortality for the year 1876 was 10,428 (*Gazette Médicale d'Orient*). Accepting these figures we have an annual mortality of about 57 persons per 1,000, a death-rate exceeding that of the unhealthiest portions of Central Europe. While these results must be considered but approximative, they seem reasonable in view of the sanitary condition described.

Miasmatic diseases are common, typhus and typhoid occurring at times as severe epidemics. During the stay of the United States steamer *Vandalia* in this port during last winter an epidemic of this description was raging to such an extent that the advisability of quarantining the ship's company was considered.

Diseases of the respiratory system are prevalent to a great extent, as would be expected from so variable a climate and the preponderance of northerly winds. Venereal diseases exist to a very small extent among the Turks. This immunity is due to the native virtue and cleanliness of the race, inspired by their religion, and, also, doubtless, to the practice of circumcision. There is no legal surveillance among the Christian communities, so that in the lower classes of Galata and Pera, gonorrhœa and chancroid are abundant.

It is an instructive as well as curious fact that though the natives live on the most intimate relations with dogs, rabies is a rare disease. It is claimed that unlicensed sexual intercourse and the abundant supply of water (fountains exist in the courts of all the mosques) fully explain this immunity.

Cholera has often scourged this city, and the plague exists sporadically on the Asiatic shore and frequently among the shipping.

Small-pox is always rife. No means whatever are taken to prevent its propagation. Vaccination is not only not compulsory, but little known, and even the country from which inoculation was made known to us hardly preserves the primitive prophylactic. Variolous cases are conveyed about the streets in sedan chairs, and I am sorry to say that this and other naval vessels here found it necessary to encourage so reprehensible a custom.

In this connection I will only mention the civil hospitals.

Stamboul contains a large hospital, exclusively for males, founded by a member of the imperial family. It is built after the prevailing style of military hospitals introduced by the allies during the Crimean war—a square, inclosing a large court. The floors in many places are of brick, and the finish of the interior, the accessories, pharmacy, etc., are extremely primitive. The Mussulman in times of peace and plenty is very averse to entering a hospital, preferring rather to live in the humblest way, without medicine or medical attention. Even in the present time of war the great civil hospital of Stamboul has half its wards empty.

The British Seaman's Hospital, located near the town of Galata, has accommodations for sixty patients, in six wards; it is but fairly well conducted; has most modern conveniences; a resident and able superintending physician. The sick of our merchant marine and Navy will be received at a cost of four shillings per diem.

The German Hospital, is in Pera, near the Taxim. It is a new and modern structure. The site is on a high hill commanding the Bosphorus and Marmora. Too much could not be said in praise of the scrupulous neatness of this establishment and the

careful attention given the sick. It is also more worthy our patronage inasmuch as contagious diseases are unhesitatingly received, with no additional charge. There are three rates of charges, first, second, and third class, in all of which not only the necessaries but some luxuries are furnished. I have placed the sick of our ship on the third class at a cost of fifteen piastres per diem (sixty cents in United States currency). This hospital has a ward for females, which is unusual in this country.

Although the Turks succeeded to the temporal and spiritual power of the Arabs, they did not inherit their advanced civilization or love for the arts and sciences. The fame of the universities of Bagdad, Seville, and Cordova, the memory of Rhazes and Avicenna would have been lost to medical literature had the Turks been intrusted with their keeping. However, the Sultan Mahmoud II was in many ways a successful imitator of the famous Caliph Haroun. Under the beneficent reign of the former virtuous prince an impetus was given all departments of learning and industry. Thus Constantinople in 1855 possessed 400 schools, attended by 25,000 pupils of both sexes. There are at this time 40 libraries open to the public, containing rare Persian, Greek, Latin, and Arabic manuscripts; and as if to deny the charge of ignorance so often brought against the Turkish people, over the doors of one of the libraries is written, "The study of the sciences is a divine precept of the true believer."

Mahmoud the Reformer, as he is known in history, wishing native surgeons for his army, founded and endowed the Imperial School of Medicine. It was furnished with museums and laboratories, while the talent of Europe was called to fill its chairs. For many years, under the fostering care of the Sultan, it flourished, but after his death underwent numerous vicissitudes. Its present condition, so far as the attendance goes, is prosperous, but several radical changes in the method of instruction have impaired its usefulness. The substitution of the Turkish for the

French language was an obvious mistake for many reasons. Deficient clinical advantages, the study of anatomy from the book and the manikin alone, dissection being prohibited by law of both church and state, are serious impediments to the future greatness of the school. Yet, despite these facts, American medical institutions can learn even here a useful lesson. The candidate for the honors of the Imperial School of Medicine matriculates at an early age, and receives first a thorough academic education, extending over a period of three years, and only when qualified in collateral sciences does he commence the study of medicine, which he pursues for four years, at the end of which time, if qualified, he receives a commission in the army.

Constantinople has an Imperial Society of Medicine, under whose auspices a medical journal is published, and it is superfluous to add it has done much for the advancement of medicine in Turkey.

There is a board of health, which contains a representative from each nationality in Constantinople. I can only say of it, that its work is most inefficiently performed; yet this is in great measure due to causes over which the board has no control.



## NOTES ON A CASE OF POPLITEAL ANEURISM.

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REPORTED BY FREDERICK M. DEARBORNE, M. D.,

SURGEON U. S. NAVY.

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James Walsh, landsman, native of New York, *æt.* 23, was admitted to the naval hospital, Brooklyn, November 24, 1877, with a strongly pulsating tumor in the right popliteal space. From the accompanying hospital ticket and his own statements, it appears that while working in the fire-room of the United States steamer Trenton, July 26, 1877, he had occasion to support upon his right knee one side of a heavy iron floor-plate, probably weighing three hundred pounds; and while doing so, and at the same time attempting to remove a lamp from beneath the plate, he felt a sudden pain, and sense of "something giving way" behind his right knee. As the work upon which he was at that time employed was then finished, he did not apply for medical treatment until next morning, when he found himself unable to use the right leg. Popliteal aneurism was at once recognized. The leg was flexed upon the thigh, and retained in that position by a roller, and a circular metallic tourniquet applied to the superficial femoral artery to control the pulsation. A few days later he was sent to the British civil hospital at Smyrna, where he remained several weeks, when he was received again on board the Trenton, and kept in a cot in the sick-bay of that vessel until an opportunity occurred, October 6, 1877, to send him to the United States by a passenger steamer. Upon admission to hospital he was found somewhat worn out by a long and stormy passage of forty-three days, with an indiffer-

ent diet. The right leg had been flexed since the occurrence of the accident, one hundred and twenty-one days, and he had been all that time in bed, with more or less continuous instrumental pressure upon the femoral artery. When uncontrolled by the tourniquet, the aneurismal tumor pulsated strongly; was the size of a goose-egg, with apparently very firm walls, and the collateral circulation seemed well established. The skin over the flexed knee was smooth and shiny; extension was impossible, and permanent immobility of the joint was feared. The patient was at once placed upon a light diet; kept quiet, most of the time in a recumbent position; the femoral artery well compressed, and daily efforts were made to extend the leg. In the course of six weeks a good degree of success had been attained in securing extension of the leg; the pulsation in the aneurism had decidedly diminished; his general health had improved. He was allowed to sit up, and walk about the ward, but soon the skin over the femoral artery became very sensitive; venous congestion of the leg occurred whenever the pressure was fully applied, and it became necessary to use the tourniquet less and less.

January 19, 1878, a modified Signoroni tourniquet, ordered especially for the case from Tiemann, was applied with better results for a while. A few weeks later the inferior supporting pad was made broader and more curved, and other slight changes, from time to time, were rendered necessary. A small abscess in the anal fossa gave considerable annoyance in June, but the general condition of the aneurism slowly improved until August 12, 1878, when, upon making the slight exertion of getting out of bed, he felt something "giving way" again in the popliteal space, suffered some pain, and became very much frightened. Upon examination the tumor was found larger, softer, and more diffused. No pulse could be detected in the posterior or anterior tibial arteries; leg and foot were cold, while the pulsa-



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tion in the sac was more marked than ever before. The patient was at once confined to his bed, the femoral circulation well controlled by tourniquet, and next day a slight increase of temperature was found in the affected limb. By September 1 he seemed again as well as at any time since admission to hospital. The tumor had resumed very nearly its usual size—that of a large goose-egg; he had recovered so completely the use of his right leg that he went up and down stairs without discomfort, and but slight uneasiness was felt in the popliteal space.

September 17, 1878, the patient having been prepared by a week's rest in bed, I ligated the femoral artery. An incision, three and a half inches in length, was made over the superficial femoral, disclosing a considerable degree of condensation of the tissues from previous instrumental pressure, and the fascia-sheath and vessels were found to be quite firmly knit together. The small arteries and veins were increased in size. The femoral artery was ligated with a double silk ligature four and a half inches below Poupart's ligament, just above the origin of two small arteries. The incision was closed by four silk sutures, the knee flexed, and the whole limb wrapped in warm blankets, and an opiate administered. Four hours later his temperature was found to be 103°, pulse 108, respiration 24, and no pulsation was found in the sac. The patient slept some during the night, and reported himself as "feeling well" next morning, although some nausea existed. His temperature varied from 100.3 at 8 a. m. to 102.4 at 8 p. m. until September 25, when it became normal. Sutures from the incision were removed three days after the operation, and the wound supported by adhesive strips; union by first intention had already occurred everywhere except at upper end of incision, where the ligature was brought out. The femoral ligature came away on the eighteenth day, and the patient has continued to improve in the use of the limb, and in general health. No signs of the tu

mor can now be found. He walks without inconvenience, but in cold weather the circulation of the limb is somewhat impaired. His discharge from the service is asked for in accordance with his own wishes, as, although the aneurismal tumor has disappeared, his general condition is such as to render him unfit for active duty for some time to come.

## CASE OF CHOREA, APPARENTLY CAUSED BY A FALL UPON THE BACK. SUCCESSFULLY TREATED WITH CANNABIS INDICA.

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REPORTED BY CHARLES A. SIEGFRIED, M. D.,  
PASSED ASSISTANT SURGEON, U. S. NAVY.

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April 12, 1876, Frederick N. Cole, *æt.* sixteen years, first-class boy, was admitted to the United States Naval Hospital, New York, from the United States training-ship Minnesota, with chorea. Condition on admission as follows: Whole body in a state of agitation; emaciated; does not appear to be anæmic; now and then jumps up violently from his seat and has to be restrained; face continually contorted; movements painful, and inclines to weep from violence of the spasms; tries to restrain himself but fails. Says his "appetite is gone, but can eat sometimes." Tongue dry; skin dry and harsh; temperature in axilla, 100° Fah.; urine dense and scant; bowels constipated. Complains of wandering pains in body, and there is tenderness over second, third, and fourth dorsal vertebræ; these symptoms have come on gradually during the last ten days. He had been on the sick-list of the ship three days before he was transferred to hospital. He is unable to state any adequate cause for his trouble, and has always been an unusually robust lad. Upon close questioning, however, he gives a history of a fall upon the back while turning back somersaults on the ship's deck, striking the spine between the shoulder-blades, at which place he complains of pain.

He was given a warm bath and placed in bed under the constant care of a nurse; later he took a dish of good nutritious soup, and during the evening two doses of chloral hydr., gr. v; morph. sulph., gr.  $\frac{1}{2}$ ; tinct. belladonnæ, gtt. v, were given with a sedative effect. The irregular muscular action did not entirely cease during sleep.

*April 13.*—Passed several hours in refreshing sleep and feels easier this morning, although the muscular spasms continue as yesterday. Bowels were relieved with 3vi of Rochelle salts. A Burgundy-pitch plaster, on sheep-skin, 4 x 8 inches, was placed over the spine between the scapulæ, and he was put on the use of strychnia sulphate dissolved in simple syrup, one-twenty-fourth of a grain every four hours, to begin with (after Trousseau). The bowels to be kept soluble by means of mild saline laxatives, and the sedative hypnotic of morphia, chloral, and belladonna to be used at night, as required.

*April 16.*—Fever subsided yesterday and anæmia was discovered. The general condition of the patient has remained unchanged since his admission, and no beneficial effect has been noticed from the strychnia treatment; therefore omitted strychnia and prescribed a pill of Extract: Cannabis Indicæ, gr.  $\frac{1}{2}$ ; ferri redaeti, gr. i, thrice daily.

*April 17.*—Notable improvement is remarked by every one in contact with the patient. He dozes a great deal and requires no one to watch him and to keep him in bed; moves his limbs easily and can control them to some extent; twitching of the muscles is much less and at longer intervals. He is given mild exercise by slowly walking in the ward between and supported by two companions, with whom he keeps step. Converses with less difficulty.

*April 22.*—Improvement is rapid. Sedative mixture of chloral, morphia, and belladonna omitted at night. Eats and sleeps very much better.

*April 29.*—Removed the plaster from the back; tenderness has disappeared. Continued the same treatment and the methodical movement of limbs; sent him to the dining-room for his meals, two flights of stairs below. Very slight twitching in the flexors of the forearms is noticed now and then; other involuntary movements have ceased.

*May 9.*—Is at this date free of all agitation and involuntary muscular movements, and looks well and strong; has gained several pounds in weight. Continued the pills twice a day for some time longer as a matter of precaution, in view of the tendency of the disease to relapse.

The disease abated almost wholly in fifteen days from the time *Cannabis Indica* was first given, three weeks from the time he reported himself sick on the ship, and one month from the time he first noticed twitching of the muscles.

A few remarks upon the pathology, etiology, and treatment of the disease, as we now understand it, may not be inappropriate, and I take the liberty of appending the following.

In the present state of our knowledge of the subject, chorea is symptomatic of a certain disturbed condition of the cerebro-spinal-motor-tract, induced by a variety of organic and functional influences, and dependent upon the region affected and the degree of the disturbance. It is probable, however, that embolism of the capillaries of some of the parts of the brain is the essential determining cause of the choreic movements in a certain number of cases, and a short account of this theory may be interesting.

Perhaps the axiom, "Local disturbances of nutrition lie at the foundation of all diseases," led Dr. Kirkes, about twelve years ago, to state that, in his opinion, "chorea is the result of irritation produced in the nerve-centres by fine molecular particles of fibrin which are set free from an inflamed endocardium, and washed by the blood into the cavities of these centres." He

did not fix upon the precise locality or parts of the brain involved, but rather drew his conclusions from having found vegetations upon the valves of the heart in fatal cases, and to the signs of heart disease during life in these and other cases.

Dr. Hughlings Jackson soon afterwards attempted to prove that the plugging of the vessels, which he regards as the cause of chorea, is in the nerve-tissue forming the convolutions *near* the corpus striatum—a part supplied by branches of the middle cerebral artery; and that the tissue is thereby not destroyed but rendered unstable from under-nutrition resulting from a diminished blood-supply. He adduced the clinical analogy between hemiplegia and hemichorea in support of his views.

Dr. Broadbent nearly contemporaneously accepted the theory of embolism, and localizes the seat of the mischief *in* rather than *near* the sensori-motor ganglia, believing that embolism of the capillaries of the corpora striata is the chief cause of chorea. He also comes to this conclusion by noting the similarity between paralysis and chorea; the chief difference being that in one case it is impairment of function only, and in the other it is abolition of function. Dr. Broadbent also instances local innutrition, reflex action from peripheral irritation, and direct action upon the sensori-motor ganglia from shock, etc. He refers, as a possible cause, to Dr. Bastian's discovery of the proximate cause of the delirium of febrile diseases—in embolism of altered and cohering white blood corpuscles.

Numerous fatal cases of chorea have been reported before and since these investigations, prominently those of Drs. Ogle and Tuckwell, in which extensive lesions of the valves of the heart and of various parts of the cerebrum have been found, and the most frequent seat of the pathological changes has probably been the capillaries of the corpora striata; still the facts of morbid anatomy do not sufficiently support the theory of embolism of the vessels of the sensori-motor ganglia as the



cause of the choreic movements, and of late years it has been losing ground.

The posterior columns of the spinal cord have at times been found to be the seat of pathological changes in fatal cases of chorea, as in locomotor ataxia, nor do the phenomena differ widely from those observed in the latter disease, but the cord is usually avoided in seeking the choreic lesion for the reason that the nerves supplying the muscles usually affected are unconnected with the cord, as, for instance, those of expression. Neither are clonic spasms phenomena of persistent spinal irritation, and they are peculiar to chorea. Clonic spasms can be, in some measure, controlled by the will; they cease during sleep, whereas phenomena of an excito-motor character are increased by the removal of volition. Fixing the attention to some other object likewise diminishes the intensity of choreic movements. "The phenomena during life, in accordance with the views expressed by Drs. R. B. Todd and Carpenter, tend to refer the exciting cause of the disease to changes going on in the central ganglia of the brain, such changes being expressed in a healthy state through volition, perception, or emotion, or the balancing and co-ordinating of movements." (Aitken.)

Niemeyer defined chorea to be a motor neurosis, all its symptoms being attributable to a morbid irritability of the motor nerves, while no constant derangement of the sensory or intellectual functions can be detected.

Trousseau believed that there is either a tuberculous diathesis or a tendency to the neurosis, as epilepsy, eclampsia, or hysteria, in the ancestors of all those affected with chorea.

The following interesting case of chorea was reported to the Pathological Society of Philadelphia by Dr. Hutchinson, physician to the Pennsylvania Hospital, *vide* Philadelphia Medical Times, August 5, 1876. A boy twelve years of age was admitted to the Pennsylvania Hospital April 23 with chorea compli-

cated with rheumatism and heart disease. He had previously suffered with severe pains in the head and back, fever, and articular rheumatism. Choreic movements began on April 4. He came to the hospital on 23d and died on the 25th of same month. The symptoms were: An apex systolic murmur, some cyanosis, tenderness over spine, contracted pupils, a temperature of  $102\frac{1}{2}^{\circ}$  Fah., and extreme general clonic convulsions—these having been developed gradually, commencing on the left side. The *post-mortem* examination showed the serous membranes of the body to have been in a state of inflammation, including the peritoneum; marked softening of the spinal cord between the third and fifth dorsal nerves, with induration of lower part; fibrinous clots and fluid blood in venous channels of the brain, bloody serum in the ventricles; the capillaries of the corpora striata, which were examined microscopically, contained blood corpuscles floating in serum and clotted blood—a condition of embolism, in the proportion of plugged to unplugged, of, in some cases, two to one, in others one to four. The auricles of the heart were filled with clots, and the valves were extensively diseased, with one or two exceptions.

The choreic movements seem to have been secondary to the profound rheumatic infection, and were apparently due to embolism of the sensori-motor ganglia. Whether the spasms were induced by irritation of the nerve cells (from which the nerves supplying the affected muscles take their origin), and consequent disruptive discharges, or whether the plugging of the vessels produced a condition of innutrition and consequent abnormal functioning, we have no absolute means of determining; but that embolism was the exciting cause of them can hardly be doubted in view of their progressive development, the presence of some paralysis, and finally the *post-mortem* appearances.

The present state of our knowledge on the subject may be

summed up as follows, leaving out the theory of Dr. Stevens, of New York, "that chorea and other nervous diseases are in many instances due to errors of refraction," as not yet proven:

1. Chorea may be regarded as a disease entirely functional or dynamic and independent of organic change.

2. That the blood in some cases is primarily diseased or becomes so constitutionally, the nature of the change being as yet unknown.

3. Associated with some other disease, whose pathology is better known, chorea has been regarded either as a concomitant feature or as a necessary consequence of their previous existence, as rheumatism and diseases of the heart.

4. Pauses in muscular movements occurring during sleep, and from the action of chloroform, render it probable that the perversion of motor influence is derived from the brain rather than from the spinal cord.

5. The nature of the spasms, the control exerted over them by the will, their cessation during sleep, their emotional dependence, and the phenomena generally during life, refer the lesion to the central ganglia of the brain—the corpora striata and the optic thalami; that embolism of the capillaries of these bodies has been shown to be the choreic lesion in a small proportion of cases.

6. No lesions have been found to be constant, and no lesions whatever have been found in some of the most violent and fatal cases.

Of the 80 cases reported in the Amer. Jour. Med. Sciences for July, 1876, by Dr. George S. Gerhard, there were 28 cases under ten years of age—9 males, 19 females; 52 cases from ten to twenty-one years—18 males, 34 females.

In 22 cases no cause was traced; a neurotic history in some.

In 11 cases the cause was fright.

In 11 cases there was rheumatism without heart disease.

In 7 cases there was rheumatism with heart disease.

In 6 cases there was heart disease alone.

In 3 cases there was hereditary predisposition.

A majority of these cases occurred in the spring months, though this seems to be peculiar to our climate. The preponderance of females over males is due to their greater susceptibility to nervous irritation from a variety of causes from which the latter are exempt. The disease may occur at any age; a model case is mentioned by Trousseau as occurring in a man eighty years old, and it continued six weeks.

In 1849 Dr. Walshe, of University College, London, in a series of experiments which were subsequently confirmed by Dr. Todd and by Dr. Bence Jones, observed that the urine pretty accurately indicated the conditions and changes taking place in the body as they occur in chorea. During the first five days the urine was febrile—high specific gravity, deep brownish gold color, strong urinous odour, and depositing lithates in abundance; second, a period of marked excess of urea—referred to muscular waste, entailed by the constant convulsive movements; next, in the fourth or fifth week, oxalates, seeming to appear with convalescence; finally, an abundant precipitation of phosphates took place, the result of previous nervous waste.

The therapeutics of chorea does not differ from that of the other neuroses in the multiplicity of the remedies employed and in the value set on them by their advocates. By any mode of treatment the curative value can only be judged of comparatively, in view of the intrinsic tendency to recovery, in the great majority of cases, in from six to eight weeks under the most ordinary hygienic conditions. But there are drugs that are beneficial, either by removing the exciting cause, by ameliorating the severity of the symptoms, or by correcting morbid states of the system, thus assisting nature's efforts and abridging the usual course of the affection.

Trousseau's plan consists in giving the sulphate of strychnia in simple syrup, commencing with the minimum dose and gradually increasing it day by day until its physiological effect becomes marked, and continuing at that point. The French also originated and employ methodical exercise of the muscles in various ways, calisthenics, and movements in measured time—a most valuable auxiliary, for obvious reasons. The narcotic and opium treatment is also common on the Continent, along with sulphur baths, galvanism of the spine, cold affusions on the back, and counter-irritation along each side of the spine and on the back of the neck.

In England and in this country, arsenic, the preparations of iron and of zinc, and the bromides are probably most used. The bromide of iron, recommended by Dr. Da Costa, was unfavorably reported upon by Dr. S. K. Mills, who used it in twelve cases. Perhaps Fowler's solution of arsenic and sulphate of zinc are preferred in the hospitals and charitable institutions in this vicinity, in addition to some form of iron, usually necessary by reason of anæmia. Chloral and nitrite of amyl are the latest remedies, and the most sanguine expectations with regard to the latter have only to be realized to put the profession in possession of a specific.

Extractum Cannabis Indicæ, the remedy employed in the case at the head of this paper, is very highly recommended by Drs. Walshe, Corrigan, and Reynolds, and by Dr. Storer, of Boston. In the majority of cases where used, the immediate beneficial effects of the drug have been remarked and commented upon. Dr. Walshe states that of all the remedies he tried, the extract of Cannabis Indica was followed by the most satisfactory results. Prof. Russell Reynolds believes it to be a most valuable remedy in many forms of nervous disease, and particularly so in chorea. They all remark and believe in the curative and sedative effect of the drug upon the mus-

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cular system. In moderate amounts *Cannabis Indica* acts as an exhilarant to the mental faculties, with a peculiar vague and indefinable feeling in the muscles; in larger quantities the action of the cerebro-spinal nervous system becomes perverted or deranged in greater or less degree; there ensues loss of volition, superficial anæsthesia of parts, confused intellection, and general derangement of the mental faculties. The quantity necessary to destroy life is unknown, and there are apparently no deaths on record from its poisonous effects.

Thus it seems to be pretty clear that the extract of Indian hemp, when pure and in appropriate doses, has a marked sedative effect upon the muscular system, and whether through loss of volition or co-ordinating power, or by perversion of the mental faculties, is a question. In the treatment of chorea, as of any malady, each case is an individual study, but in my experience this remedy, combined with some form of iron as is usually necessary, and methodical exercise, or movements in time of the limbs or groups of muscles, forms a most excellent plan of treatment to abridge the course of an average case of uncomplicated chorea.

## DEPRESSED FRACTURE OF THE SKULL.

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REPORTED BY DANIEL N. BERTOLETTE,

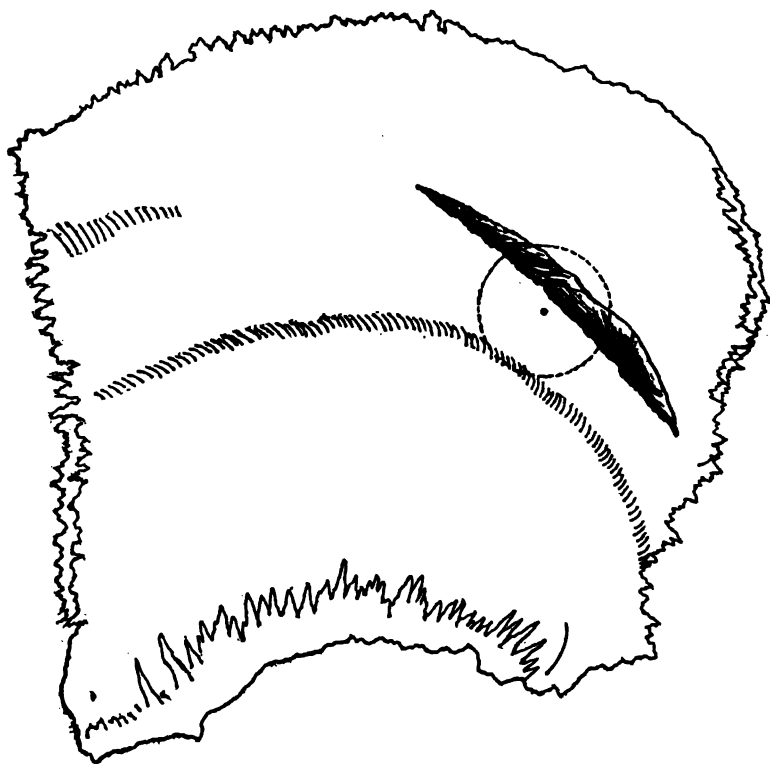
ASSISTANT SURGEON U. S. NAVY.

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Robert Creart, landsman, serving on board the Worcester, *æ*t. 23 years, black, native of Virginia, weighing 175 pounds, strong, muscular, and in perfect health, while coming down a spar-deck ladder, about 7 o'clock Friday evening, November 5, 1875, slipped and fell to the berth-deck below, a distance of thirteen feet, striking head-first upon a small staple projecting from the hatch-combing. Hardly any insensibility was produced by the fall; he walked to the sick-bay where he was examined superficially by the medical officer, who found him kneeling over a basin of water washing the blood from his head, which was proceeding from an incised wound of the scalp about two inches long. Upon inquiry he complained of nothing save some slight bruises of left arm and elbow. He was left with a wet compress to head. About 10 o'clock p. m. word was brought that "Creart was acting strangely" and could not be controlled. Upon investigation he was found in a delirious condition attended with frequent convulsions. He would commence some apparently voluntary movement, as turning in his bed, but before its completion it would become involuntary and end finally in a convulsion, at times opisthotonos.

Closer examination of the cleanly cut wound in his scalp revealed a comminuted, depressed fracture of the left parietal

bone nearly two inches long, commencing very near the left occipito-parietal suture and extending toward the front of the head along a line three-eighths of an inch above, and parallel with, the temporal ridge; the bone upon the inner or vertex side of the fracture was comminuted to the extent of three-eighths of an inch the whole length of the main fracture, and depressed nearly a quarter of an inch; the outer or lower fragment was complete, and to some extent overhung the depressed fragments. Taken all together the fracture very much resembled that produced in an egg-shell by a sharp blow with the back of a case-knife.



Upon consultation by the medical staff of the ship, it was decided, in consideration of the gravity of the symptoms and



severity of the injury, to relieve the symptoms by the elevation of the depressed bone, trephining if necessary.

About 11 o'clock p. m., four hours after the accident, the operation was begun by the administration of ether; pulse full but irregular, respiration somewhat increased in depth and frequency. The patient came readily under the influence of the anæsthetic. After carefully shaving the scalp in the vicinity of the wound, we proceeded to operate by enlarging the original wound from each end, making it three inches long over all, and then bisected the outer lip of the wound by an incision one and one-half inches long and perpendicular to the long incision, making two rectangular flaps, opening outwards. During this procedure several quite large cranial arteries were severed, producing some annoyance from the difficulty of picking up and ligating in the poor light afforded by deck-lamps. The flaps being held back by assistants, an attempt was now made (in the hope of obviating more serious interference) to elevate the depressed bone, but it was unsuccessful.

Pushing back the pericranium and laying bare the bone, a small hand trephine was applied in such a manner that the steel point in its centre rested upon the outer fragment, midway between the ends of the fracture and far enough from the edge of the fracture to remove about three-fifths of the circle from it and the remainder from the inner portion. This point was selected in order that the whole extent of the depression might be accessible from a single opening. The instrument performed very well, and the segments were removed in a comparatively short time without the slightest injury to the membranes. The skull at this point was about  $\frac{5}{16}$  of an inch in thickness. The metallic elevator was now introduced, and the depressed portions elevated along the whole length of the fracture, great force having been necessary. During the elevation a dozen or more large fragments of bone were removed, besides a great many small chips washed

away in cleansing the wound; the majority of fragments were from the inner table, and were removed because they were entirely free and unattached to any tissue.

After thoroughly cleansing and carefully examining the wound, it was closed by simply replacing the flaps of the scalp, covering the wound with a dressing of lint and water, and a bandage over all.

About 1.30 o'clock a. m., the patient having sufficiently recovered from the effects of the anæsthetic, he was removed from the operating-table and placed in a swinging cot on the gun-deck aft. During the operation the pulse became at times very small and weak, but upon admission of fresh air to the lungs it immediately recovered.

No temperature was taken until after the operation, but up to this time there had been no apparent increase. At 4 o'clock a. m. was left sleeping quietly in charge of nurses.

#### NOVEMBER 6, 1875.

8 a. m.—Condition extremely good; slept well during last four hours; is perfectly conscious, intellect good; pulse rather small, about 90 per minute; temperature  $101^{\circ}$ ; skin moist and natural; tongue flabby and slightly coated. There has been no movement of bowels or bladder. Complains very much of severe pain in head, locating it in the frontal and temporal regions. He lies quietly in a swinging cot; has no appetite. Ordered Valentine's beef extract, 3j in ice-water every two hours.

12 m.—Pulse 85, fuller than this morning; temperature  $101^{\circ}$ ; condition otherwise the same.

4 p. m.—No change.

8 p. m.—Is quite lively; took some food, but has very little appetite; passed some urine; pulse 85; temperature  $99^{\circ}.8$ .

12 p. m.—Left him sleeping quietly.

## NOVEMBER 7, 1875.

8 a. m.—Slept well during the whole night; moved bowels slightly this morning with an enema of castor-oil and soap-water; passed some urine with the fæces; complains still of pain in forehead; took an egg, some toast, and tea for breakfast; pulse 80, full and soft; temperature 98° 4.

12 m.—Doing well; moved him forward.

4 p. m.—Doing well; ordered him to be moved to the half-deck again, because the wind has drawn aft and the vessel is pitching too much for comfort in his present position.

8 p. m.—Voided about 14  $\frac{3}{4}$  urine; pulse 90, somewhat fuller and quicker; temperature 98° 4.

12 p. m.—Sleeping quietly.

## NOVEMBER 8, 1875.

8 a. m.—Passed night comfortably; pulse good; skin natural; temperature 98° 4; no change in treatment.

12 m.—Complains less of pain in head; dressings of wound have not been disturbed since operation; moved forward again close to bridle-port.

4 p. m.—Has been reading the papers during the afternoon; vessel again pitching, so he is to be moved aft.

10 p. m.—Doing very well; temperature 98° 4.

## NOVEMBER 9, 1875.

8 a. m.—No change.

12 m.—Bowels have not moved; to have two compound cathartic pills; pulse, tongue, and temperature normal.

4 p. m.—Slight pain in frontal region.

8 p. m.—Doing so well that night watch is discontinued.

## NOVEMBER 10, 1875.

8 a. m.—The pills ordered yesterday having failed to operate, bowels were moved by an enema, as before; pulse has increased

somewhat in frequency, and temperature is a little higher,  $98^{\circ}6$ , with increase of headache, all probably due to the exertion of rising to stool. Wind and sea have risen, and the vessel is being tossed about. Removed the bandage from head, but did not disturb the lint in immediate contact with the wound; no odor perceptible; lint dry. Omit beef extract, as it has become distasteful; appetite for ordinary food is very good, but the amount eaten small.

12 m.—No change; headache the same; pulse has returned to its ordinary beat; temperature  $99^{\circ}4$ .

4 p. m.—Headache increasing, probably due to the motion of the ship; temperature increasing,  $100^{\circ}$ .

8 p. m.—Removed and changed dressings; the whole incision has united by "first intention," except where the ligatures come out and at the junction of the incisions; there is no bagging or swelling, no tenderness nor heat of parts. At 6 p. m. complained so much of headache, all frontal, that potas. bromid. gr. xxx was given; no relief as yet; dose to be repeated at once; wet cloths to be applied to head.

10.30 p. m.—Patient is now quiet under the influence of a third dose of potas. bromid. given at 9.30 p. m.; temperature  $100^{\circ}$ .

#### NOVEMBER 11, 1875.

8 a. m.—Temperature  $99^{\circ}$ ; passed a very comfortable night; headache much decreased. During an inspection of the ship he was moved about considerably, up and down hatches, etc., and is consequently somewhat excited.

12 m.—The excitement of the morning has had no permanent ill effect; pulse, respiration, and temperature about normal; headache less; temperature  $99^{\circ}$ .

4 p. m.—No change.

12 m.—Temperature  $99^{\circ}8$ .

NOVEMBER 12, 1875.

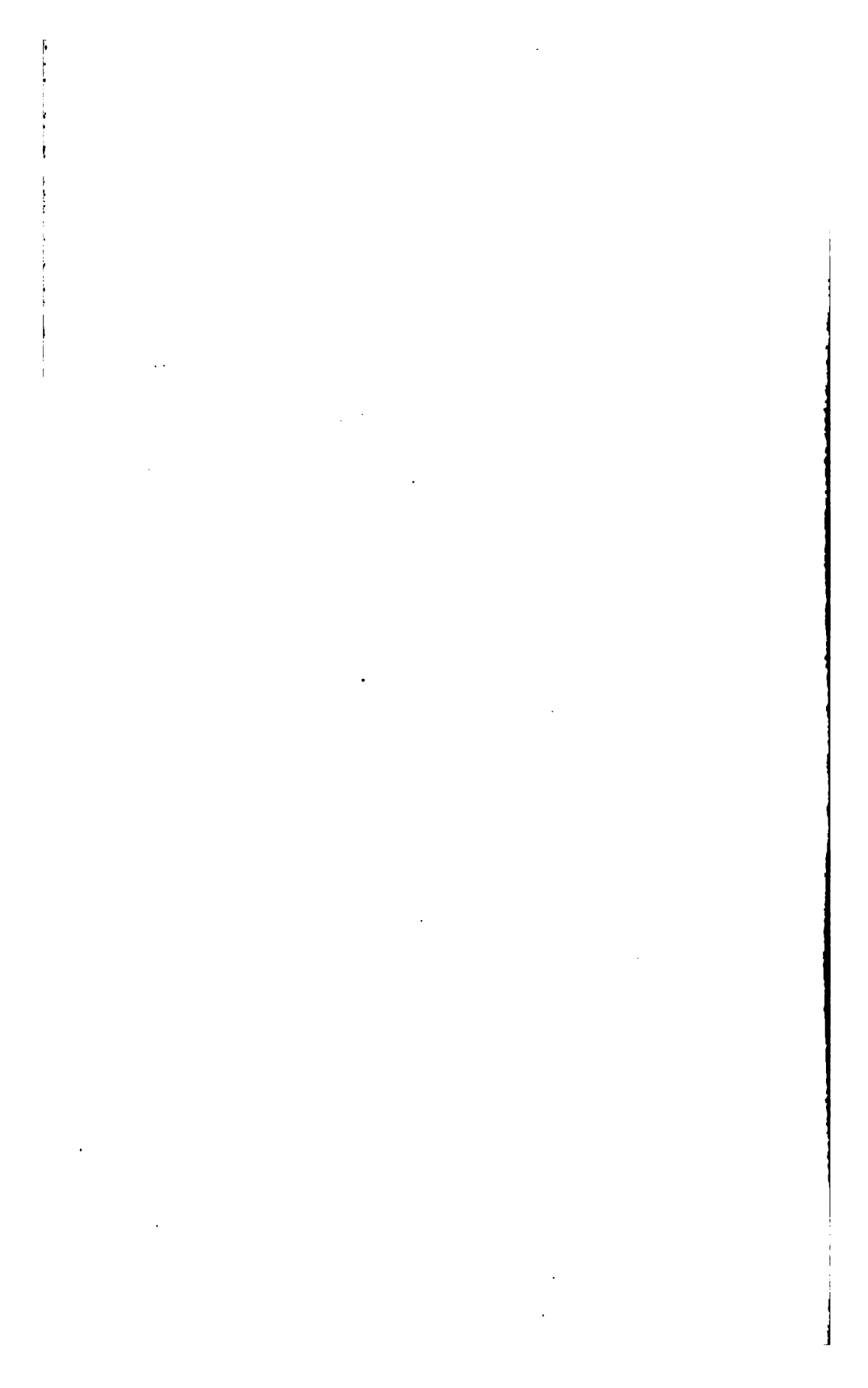
8 a. m.—In spite of the excitement and confusion attendant upon coming to anchor last night patient continues to improve; bowels have not moved for 48 hours; temperature 98° 4.

*November 13, 1875.*—Doing well; removed to Norfolk Naval Hospital about midday; patient cheerful and strong; walked, alone down the gangway into the boat.

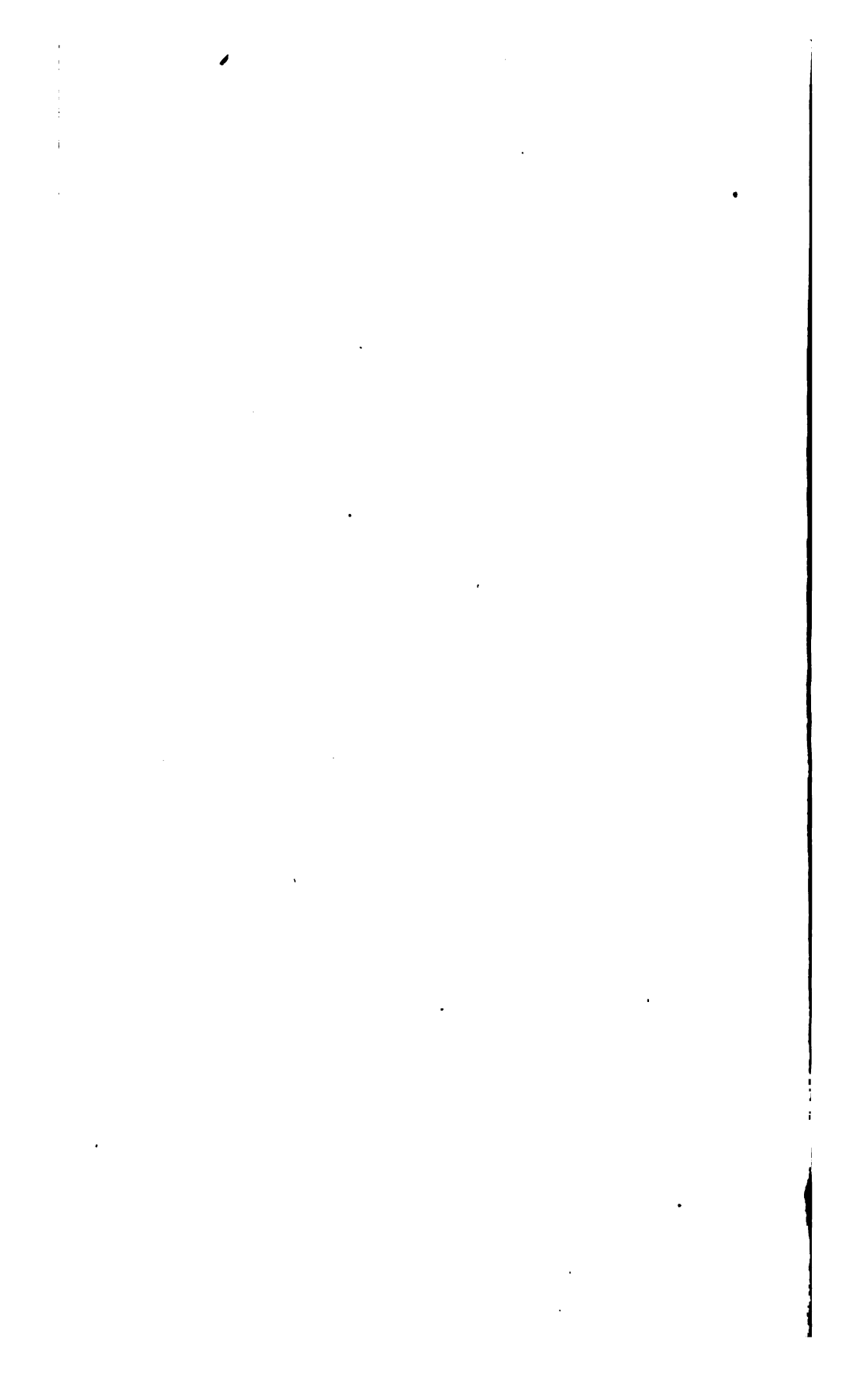
*November 16.*—We visited the hospital and found the patient in a very good condition; find that he suffered somewhat from fatigue consequent on his transfer.

*December 2, 1875.*—Visited patient at hospital several times; he was always doing well. There has been some discharge of pus from the wound; has had no untoward symptom within the last week. The medical officer in charge of hospital reports a slight irregularity of pulse, together with a lessening in frequency to about 50 per minute.

*December 21, 1875.*—To-day patient visited the ship; wound has cicatrized completely. He presents no evidence of his accident save a slight tenderness, upon direct pressure, immediately over the spot where the trephine was applied.









# U. S. NAVAL ACADEMY, ANNAPOLIS, MD.

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REPORTED BY ALBERT L. GIHON,  
MEDICAL INSPECTOR U. S. NAVY.

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JANUARY 1, 1877.

## I. HYGIENE.

The Naval School, of which the United States Naval Academy at Annapolis, Md., is the development, was established at the present location in October, 1845, and has continued there, with the interruption of four years from May, 1861 to October, 1865, when the circumstances of the civil war induced its temporary removal to Newport, R. I.

## PERSONNEL.

The *personnel* of the institution varies considerably during the year. It is largest in number at the commencement of the annual term in September, after the new class has been admitted and before there have been any resignations or dismissals for misconduct and deficient academic standing. It is smallest during the summer after the graduation exercises and the departure of the first and third classes on the practice cruise, and the absence on leave of the second class and of the majority of the officers, whose families generally accompany them during the vacation. A large proportion of the enlisted men and attendants is attached to the practice-ships, and others are temporarily discharged.

At the present time, which represents an approximately cor-

rect average for the academic year, there are attached to the school :

Cadets.....	328
Officers:	
Commissioned officers U. S. Navy and Marine Corps .....	65
Civilian professors, assistant professors, and instructors .....	17
Warrant-officers and mates, United States Navy.....	10
Commissary, secretary, clerks, and apothecaries .....	16
	— 108
Enlisted men:	
Petty officers, seamen, ordinary seamen, and landsmen .....	105
Marine guard, sutler, and laundresses.....	100
Band .....	29
	— 234
Attendants: Mechanics, laborers, servants, etc.....	181
	—
Total .....	851

The greatest number of cadets at the school during the term was 346, which makes the maximum official population for the quarter just ended 869.

This does not, however, represent the whole number of individuals associated with this establishment and having sanitary relations with it, directly and indirectly.

Of the 108 officers, all but 30 are married or have families living with them, and of the 105 enlisted sailors only 40 are single.

The accompanying table represents, in detail, as far as it has been possible to obtain accurate information, the additional population of women, children, and domestic servants.

The 78 officers' families aggregate 298 individuals, an average of 3.82 persons to each family, exclusive of the officer himself; or, omitting 110 servants, an average of 2.41 women and children in each family.

The families of the 65 married sailors aggregate 162, an average of 2.49 persons to each family; 19 married bandsmen (all foreigners) have families amounting in the aggregate to 63, an average of 3.3 to the family.

Assuming 2.5 persons as a fair general average of women and children in a family (and this is actually the composition of the families of the few married marines and of the married naval officers on the station who are not attached to the academy), and assuming that two-thirds of the 181 attendants are married, it will not be far from correct to assume that these 120 married have at least 300 women and children dependent upon them, giving an approximate general total of 1,714 as the measure of population influence of this establishment upon this locality. Of this number 643 reside within the walls of the academy, and 1,071 within the municipal limits of the city of Annapolis, of which they form about one-sixth of the entire population.

The following are the official census returns of the population of Annapolis since the organization of the academy:

1850 .....	3,011
1860 .....	4,529
1870 .....	5,744
1876 (estimated) .....	6,500-7,000

*Aggregate population of cadets, officers, attendants and others, and their families, at United States Naval Academy, Annapolis, Md., December 31, 1876.*

Occupation.	Residing within academic limits.						Residing in Annapolis.						Aggregate.
	Adults.			Children.			Adults.			Children.			
	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	
Cadets.....			328										328
Commissioned officers, United States Navy.....	52	43	18	22	3	19	9	10		3	12	51	85
Commissioned officers, United States Marine Corps.....							5	8		2	1	1	8
Professors, assistant professors, and instructors.....	8	2					10	12	5	13		10	25
Warrant officers and mates, United States Navy.....	3	1					4	7	7	8	3		60
Secretary, clerks, commissary, and apothecaries.....	2	3		5	2	12	14	12	3	5		4	29
Total officers and their families.....													38
							183						406
ENLISTED MEN.													
On board the ships.....	36						36	69	60	53	49		267
Marine guard.....	91	5					96	3	4	9	5		21
Band.....								36	14	25	17	1	95
Total.....													347
							132						479
ATTENDANTS, ETC.													
Civil list.....								9					9
Watchmen.....								5					5
Mechanics.....								23					23
Laborers.....								15					15
Servants for cadets.....								28					28
Attendants, department steam-engineering.....								10					10
Attendants, hospital.....								3	1				4
Commissary's servants.....								38					38
Laundresses.....									38				38
Tradesmen.....								11					11
Total.....													181
Officers on the station on leave, etc.....								6	5	3	4	3	20
Total.....													771
							643						1,414

## QUARTERS.

The academic buildings are scattered irregularly over the grounds within the walls as indicated on the accompanying map. They comprise recitation-halls, museums, hospital, chapel, library, observatory, armory, gymnasium, pistol-gallery, swimming-tank, and the various other structures required for instruction and administration, besides quarters for officers and cadets.

Twenty-eight dwellings are occupied as residences by as many officers and their families, and sixteen other families are accommodated in suites of apartments, of seven or eight rooms each, in two double blocks of four-storied houses. Eighteen unmarried officers are quartered in Nos. 7, 8, and 9 of a row of buildings erected between 1854 and 1856 and now known as the "Old Quarters." The remaining buildings of this row, Nos. 1-6, are occupied by the first class of cadet-midshipmen and the three classes of cadet-engineers. The first floor of the large four-story brick building at the west end of the inclosure, erected in 1869, and known as the "New Quarters," is devoted to offices, recitation-rooms, and cadets' mess-hall. In the basement are the cadets' kitchen, laundry, and store-rooms. The second, third, and fourth floors are used as quarters for the second, third, and fourth classes of cadet-midshipmen. The following table exhibits the distribution of rooms among the several classes of cadets at the academy:

## OLD QUARTERS.

Building No. 1 (two stories).....	8 rooms; occupied by	16 cadets.
Building No. 2 (two stories).....	8 rooms; occupied by	16 cadets.
Building No. 3 (two stories).....	8 rooms; occupied by	16 cadets.
Building No. 4 (two stories).....	8 rooms; occupied by	16 cadets.
Building No. 5 (three stories) .....	18 rooms; occupied by	36 cadets.
Building No. 6 (three stories) .....	12 rooms; occupied by	24 cadets.
Total.....	62 rooms; occupied by	124 cadets.

## NEW QUARTERS.

Second floor .....	28 rooms; occupied by	56 cadets.
Second floor .....	3 rooms; occupied by	3 cadets.
Third floor .....	29 rooms; occupied by	58 cadets.
Third floor .....	5 rooms; occupied by	5 cadets.
Fourth floor .....	30 rooms; occupied by	60 cadets.
Fourth floor .....	4 rooms; occupied by	12 cadets.
Total .....	99 rooms; occupied by	204 cadets.
Aggregate .....	161 rooms occupied by	328 cadets.

The following are the extreme dimensions of the rooms occupied by the cadets, no deduction being made for the furniture and bodies of the inmates :

Location.	Linear dimensions.			Cubic contents.	Air-space per inmate.
	Length.	Width.	Height.		
	' "	' "	' "	Cu. ft.	Cu. ft.
Old quarters, small rooms.....	15	14 6	9 10	1,957.5	978
Old quarters, large rooms.....	15	15	10	2,250	1,125
New quarters, small rooms.....	14	13 10	12	2,324	1,162
New quarters, large rooms.....	21 10	17 10	12	4,672	1,597
Average cubic air-space for each cadet.....					1,265

All these rooms are heated by steam and lighted by gas, both generated on the grounds. The rooms at the old quarters are ventilated by ordinary chimney-places closed by fire-boards; those at the new quarters by registers opening into ventilating flues and by transom-windows over the doorways, which are required by the regulations to be always kept wide open. Although the average individual air-space represents a room 10 feet high, 10 feet wide, and 12 feet long, which is larger than the chambers the majority of these lads have occupied in their own homes, it is, however, to be desired, in accordance with the most recent sanitary experience, that each room at the old quarters, and all those at the new quarters which have a less capacity than 4,000 cubic feet, should have only one occu-

pant, but until additional quarters are provided by act of Congress, no other arrangement is feasible, and at the commencement of the session it is occasionally necessary to put four cadets of the newly appointed class in one of the largest rooms.

The officer-in-charge is required to regulate the temperature of cadets' rooms, and is responsible if they are kept unnecessarily warm. Few young persons, themselves, have sufficient judgment to properly regulate steam-valves or to open windows and doors for ventilation. Indeed, the majority of even officers' quarters are kept so close and overheated as to be unwholesome. The same domestic expedients of window-pane ventilators, or irremovable ventilating troughs under the lower sashes in each room, which have been recommended for private residences, might be of some service, especial care being taken to enforce the regulation to prevent the transom-windows over the doors ever being closed.\*

It is probable that a large proportion of the headache which, during the past year, occasioned the loss of 644 days of study and exercise by cadets on the sick and excused-lists, may be due, with other personal imprudences, to defective atmospheric conditions. This one complaint is represented by 1,545 cases recorded in the medical journals since the year 1845, being one-twelfth of the entire number of sick treated at the academy since its foundation; but as the majority of such cases have been simply placed on the sick and excused lists for a single day, without entry on the journals, or have not been reported at all, requiring only exposure to fresh air for their relief, the official reports fail to give a correct estimate of their number. Thus, during the quarter ended December 31, only five cases of cepha-

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\* These transom-windows were subsequently wholly removed from above every door; and a board six inches deep was placed in each window under the entire length of the lower sash, causing this to overlap the bottom of the upper sash for a corresponding distance, through which a current of fresh cold air was injected into the room above the heads of the occupants.

alalgia appear upon the registry of patients, while 157 cadets have, during that period, been placed on the daily sick-lists and 30 others on the excused list for this affection.

Bare lists of figures, especially in connection with this particular class of complaints at educational establishments, are not conclusive evidences of direct causation or a just measure of morbid influence, since none is so easily affected by deficient scholars seeking to evade recitations or their exercises, and none more difficult of precise determination. The coincidence of repeated assertions of ailing with unsatisfactory academic standing, is an element which must not be ignored, and I hope hereafter to be able to present such conclusions as careful investigation in this direction may justify, in connection with the positive information afforded by analysis of the air of the rooms during sleeping and study hours, as well as that of the recitation-rooms, chapel, hospital, and other occupied apartments. When inclement weather requires the cadet formations to be held in the lower corridor of the new quarters, a very few minutes suffice to render the air unwholesome, but until the erection of a proper place for such formations in the open air, roofed over as a protection from rain and snow and summer sun, is authorized, or a central ventilating shaft is constructed, no other remedy can be suggested but to keep all doors, transom-windows, etc., in the corridor and adjoining rooms wide open during the formations, and make these continue as short a time as possible.

The objections to having the laundry and kitchen work performed in the basement of the same building occupied as quarters by so many youths, are manifest. A detached structure for these purposes is a sanitary necessity.

#### QUARTERS ON SHIPBOARD.

A few officers and their families and enlisted men, in all, 45 individuals, reside on board the vessels attached to the acad-



emy, to wit, on board the Santee, 25; Constellation, 8; Dale, 6; Phlox, 3; Nantucket, 2; and Mayflower, 1. Of these, the Santee, an old-fashioned fifty-gun sailing frigate, is moored permanently at the wharf, and is used during the summer months as the residence of the portion of the new fourth class of cadets admitted in June, and during the rest of the year for exercises in gunnery and as a place for the confinement and quarantine of cadets undergoing punishment. The ship is warmed by steam and lighted by gas, led from the grounds, and is sufficiently capacious for the purposes ordinarily required. The removal of the cadets from both the old and new quarters during the summer, is desirable for making necessary repairs of buildings and furniture, repainting, whitewashing, and other cleaning, but the admission of any portion of the fourth class in June is of very doubtful propriety, since without at all considering whether any decided advantage of study is unfair to the members of the same class, admitted three months later, who have to compete with them, the residence, during the summer and early autumn, of lads who have been recently subjected to the depressing influences of preparative study and examination and to separation from home associations, on board a ship moored to the shore, in a region of undoubted miasmatic character, cannot be commended as a wise sanitary precaution. The following special sanitary regulations have been instituted, with the approval of the superintendent, during the residence of the cadets on board ship:

SUMMER SANITARY REGULATIONS FOR U. S. S. SANTEE.

1. Coffee and bread will be issued at 6.12 a. m., before swimming is permitted.
2. Exposure to sun and rain will be carefully avoided during all out-door exercises.
3. Sleeping on deck or in draughts will not be permitted.

4. Underclothing will be required to be worn at all times.
5. Clothing, shoes, and stockings will be changed whenever accidentally or unavoidably wetted.
6. Cadets will immediately report to the medical officer when they feel at all unwell; and when there is predisposition or susceptibility to malarial influences, small doses of quinine will be administered in the morning as a prophylactic.
7. The officer of the day and captains of guns' crews will immediately report to the commanding officer any neglect of these regulations, and any evidence of ill health on the part of cadets as shown by persistent loss of appetite at meals, listlessness, or unusual slowness at exercises, or inattention to instructions.

#### MARINE BARRACKS.

The objection to the summer residence of cadets pertains to the present location of the permanent quarters for the marines attached to the post. The fact that the nature of their duties as the military police of the station requires them to live within the walls, and the further fact that their connection with the post is merely a temporary incident of service, explain the disparity between their condition and the number of sailors and musicians married and residing in Annapolis. The entire marine force, excepting the officers, one sergeant, the sutler, and laundresses, is quartered partly in a long room in a one-story frame building, erected over the water, on and near the end of the long wharf leading to the ships, and partly on board the Wyandank,\* an old rotting "double-ender," both places being unsuitable substitutes for a proper marine barracks, for which there are admirable sites on ground belonging to the government.

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\*After considerable trouble in keeping her afloat, the Wyandank finally sank at her moorings, and at the date of this publication (August, 1879) had not been raised.

The dimensions of the room on the wharf are—length 105 feet, width 29 feet 6 inches, and height 9 feet 10 inches, making a superficial area of 3,097.5 square feet, and a cubic capacity of 30,458 cubic feet. The regulations for the United States Marine Corps allow each of the rank and file 37 square feet on stations north of latitude 38°. As there are 100 bunks (iron frames in two tiers) in the quarters, the space is one-sixth less than required by regulation. Superficial area, however, is a very unsafe measure for the apportionment of habitable space. The actual capacity of the room is only 304 cubic feet per bunk, or 380 when the force is reduced to 80 men. As only about half the command, that is from 40 to 50 men, ever actually sleep in the room at one time, each man really has from 600 to 760 cubic feet of air-space.

The room on board the Wyandank, in which that portion of the day's guard who are not on post, 20 to 25 men, sleep, is 36 feet 4 inches long, 15 feet wide, and 12 feet high, making a cubic capacity of 6,540 cubic feet, or only from 260 to 325 cubic feet per man. When extraordinary provisions are in operation for the renewal of the air of an apartment, that is, when its atmosphere can be wholly renewed three times every hour, 1,000 cubic feet are the established minimum air-space consistent with the continued maintenance of perfect health.

These apartments are heated by steam and ventilated by ordinary windows in the sides. A series of ventilators in the ceiling of the long room on the wharf, which had to be closed on account of the dust and dirt falling from the loft overhead, might be continued to the roof if the necessary expense of alteration were authorized. No serious disease has ever attacked the guard, but temporary exemption is no security against danger in the future, and it is only when a contagious or virulent disease, as cholera or yellow fever, affects a place, that bad sanitary conditions are strikingly manifested and their influence extended to sites that would otherwise have escaped.

## SEWERAGE.

The drainage of the academy is effected by sewers, made of glazed terra-cotta pipes, the largest ten inches in diameter, the number, location, and course of which are indicated on the map of the grounds. They are provided with ordinary water-traps at the closets and other entrances, and with running traps out of doors close to the houses. These have the defects of the traps in common use in our large cities. A short time suffices to saturate the water in the trap with sewer-gas, which is given off into the apartment, of which in private residences the window is closed and the door usually left open for warmth, thus insuring the vitiation of the air of the house. This is further accomplished by laziness, on the part of servants and others, who permit foreign substances to enter and obstruct the pipes; by carelessness, especially on the part of children, in not emptying and allowing a sufficient flow of water into the pans, leaving the traps full of fecal matter; and by the faulty construction of seats and basins, which secures their soiling. While this is as true of officers' residences as of the ordinary city dwelling, the water-closets of the cadets at both the old and new quarters are in detached buildings, with covered approaches, thus preventing the vitiation of the air of the quarters.

Every sewer-trap, especially those within doors, should communicate with the outside air by a pipe, leading, if possible, through a chimney-flue above the roof; a heavy flow of water should be arranged to continue automatically during use; and a small stream should, at all times, be allowed to trickle into every inlet, as in the public urinals. The benefit of communication with the external air was illustrated in the instance of the superintendent's quarters, where the odor of sewer-gas, which was unmistakably manifest whenever the wind or tide

operated upon the exit-orifice of the main, was entirely removed by the establishment of such a communication.

Provision exists for flooding the principal drains at several sites in the grounds. During the past summer the rainfall from the roof of the hospital has been conducted into the main drain running behind the new quarters. The tin water-pipes leading to the drains from the gutters in the roof serve at other times as vents for sewer-gas. The supply of water from the city works being sufficient to render unnecessary the collection of rain-water in the cisterns in the yards of officers' quarters, the same system is feasible in connection with them, and might be happily introduced in all cities where so much rain-water is wasted in surface drainage.

The drain under the old quarters, the situation of which is objectionable, since the escape of sewer-gas in noxious quantity is possible, even when no odor is recognizable, is very little used except from its connection with the officers' quarters, the cadets' water-closets being in a detached building indicated on the map, with its own sewer leading directly to the river. This drain during the past year was discovered to have been occluded by a remarkable mass of matted root fibers, many feet in length, which had grown from a single small fibril, that had found entrance through a crevice in the pipe, and yet, though all discharge through the pipe had been necessarily interrupted for a very long time, to permit this extensive growth, the sense of smell gave no early indication of the obstruction.

#### LIGHTING.

The gas used for lighting the quarters and grounds is manufactured within the inclosure. The two gasometers have a capacity of 20,000 cubic feet. During the winter the daily consumption amounts to 30,000 cubic feet. Prof. Charles E. Munroe, professor of chemistry at the Naval Academy, sum-

marizes the results of several analyses of the gas in the following report:

"That the gas contains only a trace of carbonic acid, is free from ammonia and the sulphides of hydrogen and ammonium. It contains 1.325 grains of sulphur in 100 cubic feet, and has an illuminating power of 21.2 candles."

The increasing complaint of impaired vision by so many of the cadets at this academy, in common with students elsewhere who read and work by artificial, especially gas, light, is a matter of serious concern. It has been remarked, however, that the cadets who make the most complaint of loss of visual power are almost invariably low in class standing, and that such complaints precede critical examinations; but it is also true that others, who have complained but little, if at all, while at school, a few years after graduation require to wear glasses. No vocation demands acuter vision than that of the naval officer. Skill and acquirements are practically useless without good eyesight, and reliance cannot be placed upon the remedy of defective vision by glasses, since a single blast of spray or smoke or dust renders them useless, while their irreparable loss might totally disable their wearer. No more important sanitary question can, therefore, engage the medical officers of this station. Some benefit has been derived from the introduction of argand burners, and I have suggested the addition of violet-tinted chimneys, but experience has shown that the complete cessation of study by artificial light is absolutely necessary in decided cases of asthenopia to avoid such permanent impairment of vision as will unfit the cadet for his profession. Accurate records of the visual power of newly appointed cadets are now kept, and it is proposed to continue this examination annually during their residence at the academy, with the view of determining precisely the extent and cause of the impairment of vision and the best method of preventing it.

## HEATING.

The method of heating the buildings by steam is probably as convenient and economical as can be devised. Two boiler-houses, located at the extreme ends of the grounds, supply the steam, which is led through 4-inch wrought-iron pipes, covered with felt, the greatest extent of conduit being 1,775 feet. When the temperature is over 65° Fah., the fires are banked and all steam is shut off; between 35° and 65°, it is shut off at 9.30 p. m. and let on again at 6 a. m.; between 25° and 35°, it is continued until 10.30 p. m.; and below 25°, during the whole twenty-four hours. If care is had to keep water in the pans suspended on the steam-coils, sufficient moisture is supplied the air to be conducive to health and agreeable to the feelings. Exposed wall-pipes, running around the room near the floor, are preferable to encased coils, serving less as receptacles for dust and dirt, and effecting a more equable distribution of heat. The effort is made to maintain the temperature of all apartments as uniformly as possible between 68° and 70° Fah.

## WATER.

Excepting that obtained from a few wells and cisterns within the grounds and some neighboring pumps, the supply is from the Annapolis water-works, which are situated about five miles from the city. The water is obtained from a creek which empties into South River, and is fed by springs emerging from high hills on either side. It is forced by a Worthington steam-pump into a reservoir 131 feet high, from which it is distributed by an earthen main. It is delivered at the academy with a pressure of about 45 pounds to the square inch. The average daily consumption at this season is 80,000 gallons.

Professor Munroe has kindly favored me with the following

*Analysis of Annapolis service-water.*

Date of examination.	Non-volatile.	Volatile.	Total.	Analyst.
June 23, 1876.....grains in U. S. gallon...	2.80	1.76	4.56	Charles E. Munroe.
June 23, 1876.....do.....	2.68	1.82	4.56	Do.
September 29, 1876.....do.....	2.08	1.34	3.42	Do.
September 29, 1876.....do.....	2.01	1.50	3.51	Do.
September 30, 1876.....do.....	2.50	1.34	3.84	Do.
September 30, 1876.....do.....	2.67	1.34	4.01	Do.

*Comparison with other waters.*

Charles River, Brookline, Mass.....	2.30	1.52	3.82	Charles E. Munroe.
Charles River, Brookline, Mass.....	2.31	1.60	3.91	Do.
Mystic River, Boston.....	3.27	1.21	4.48	W. K. Nichols.
Cochituate, Boston.....	1.00	4.40	5.40	Do.
Croton River, New York.....	6.66	4.28	10.93	B. Stillman, Jr.
Schuylkill River, Philadelphia.....	4.26	1.24	5.50	Do.

This water compares favorably with other potable waters in use, so far as we may judge from the comparative determinations. The difference in the amount of impurity found in June as compared with that in September was due to the fact that the filtering-gallery at the reservoir had been refilled during the summer. Waters which contain less than three grains of volatile (organic) matter and ten grains of total solids to the gallon are considered potable. The Annapolis water is usually turbid in the spring, depositing a sediment of the reddish color of the soil. This and a frequent cloudiness from effervescence as the water is drawn at the faucets, especially of the hot-water pipes, caused by the escape of air which had been carried in through apertures in the earthen mains, have given the water an undeserved reputation for unwholesomeness, intestinal derangements being ascribed to it, which were really due to errors of diet or other personal indiscretions.

## FOOD.

The commissary informs me that no regular subsistence table is observed at the academy. The accompanying schedule rep-



resents the last printed diet scale, which is substantially that now in operation. The quantity of food is undoubtedly ample, as is evidenced by the marked increase in the weight of the newly admitted cadets, and it is as varied as the rather limited market of Annapolis will permit. I have recommended the entire omission of pies from the Sunday dessert and the substitution of fruit as often as possible. Pastry requires a culinary proficiency hardly to be expected in public institutions where hundreds of individuals are fed. I have also recommended that the sale of pastry at the stand in the basement of the new quarters be interdicted.\* Both that purchased at this place and that supplied at the mess-tables are popularly credited as causing much of the digestive disturbance which figures so largely on the medical returns: 1,257 cases of colic and constipation, 1,841 of diarrhœa, 396 of dyspepsia, and 290 of other gastro-intestinal derangements, in all, 3,784, of sufficient severity to have been recorded in detail, appear on the records, or more than twenty per centum of the entire number treated at the academy; but, as already instanced with respect to "head-ache," these figures give no adequate exhibit of the actual number of cadets unfitted for study and exercise by avoidable errors of diet. During the quarter just ended, alone, nearly 200 such cases have occurred. A very large proportion of these is due to the injudicious kindness of parents and friends in sending boxes of pastry, cakes, candies, preserves, nuts, etc., especially on anniversary occasions. Thus, Thanksgiving Day (November 30) was signalled by an increase of the number of sick cadets from 14 to 46 on the following day, 49 on the day after, and 41 on the next. On Christmas there were only 13 cadets sick; on the 26th of December there were 39, and on the 27th 36. A strict hygiene would, undoubtedly, discountenance

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\* These recommendations have been carried into effect, and the cake-stand in the basement has been abolished.

this license to get sick, since protracted illness may readily follow such imprudence, or the seeds of serious maladies be thus implanted, but parents themselves would probably be the first to resist the attempt to prevent it. Some restriction, however, is necessary upon intemperate indulgence in cakes and confectionery purchased at the stand in the basement, and sometimes involving the entire expenditure of the dollar of monthly spending money, the issue of which is, in consequence, always signalized by an increased sick-list. Ripe fruit, also, may properly exclude fried pastry, nauseous sweetmeats, and indigestible nuts from the stock offered for sale.

*Bill of fare for cadets, United States Naval Academy, Annapolis, Md., 1874 and 1875.*

Day of week.	Breakfast.	Dinner.	Supper.
Monday .....	Cold and hashed meat.	Soup. Roast beef. Corned beef.	Tea and coffee. Wheat and corn bread. Fruit.
Tuesday ... ..	Fresh or salt fish.	Soup. Roast beef. Mutton.	Butter and molasses. Nomet. No
Wednesday .....	Cold and hashed meat.	Beef soup. Bouilli. Corned beef. Fruit or puddings.	
Thursday .....	Cold and hashed meat. (Salt fish (October 1 to April 1). Fish with two hard-boiled eggs (April 1 to October 1). Cold or hashed meat.	Soup. Roast beef. Mutton (February 1 to November 1). Poultry (November 1 to February 1). Soup. Pork and beans. Fish additional (April 1 to October 1). Oyster soup (October 1 to April 1). Soup. Roast beef. Corned beef. Mutton.	Tea and coffee. Wheat and corn bread. Fruit.
Friday .....			
Saturday .....			
Sunday .....	Beefsteak.	Beef soup. Hot meat. Pies and cheese.	

## CLOTHING.

There is very little room for improvement in the clothing of the cadets. That of the enlisted men, both sailors and marines, has the usual faults of that throughout the service, especially in the matter of shoes and head-gear. The use by cadets of low-quartered, thin-soled pumps, with fancy thin stockings, is forbidden by regulation. They are also required to wear waterproof coats, leggings, and overshoes, and to have a proper supply to change when wet. Whatever consequences follow their being thinly clad or wet are due solely to personal indiscretion and in violation of the most careful foresight on the part of the authorities.

The use of coarse overhauls during unclean exercises contributes to the preservation and cleanliness of clothing, which with cleanliness of body are not only social graces of the officer but sanitary safeguards of the individual.

Facilities for bathing and swimming are unexceptionable. A tank containing 14,400 gallons of water, heated by steam to 80° Fah., enables the new classes to learn to swim and to practise swimming during cold weather. The average temperature of the surface river water opposite the academy is, during April, 65°; May, 68° to 70°; June, 75°; July, 78° to 80°; August, 80°, and September, 80°, during which months daily swimming exercises are required.

Gymnastic exercises, boxing, fencing, with the various frequent professional drills at great guns, howitzers, and small-arms, and in practical seamanship aloft, are important aids to the physical development and sanitation of the cadets.

## TOBACCO.

A further experience of a year has confirmed the propriety of the rigid interdiction of smoking, permitted until December, 1875, to the senior classes of cadets. In the language of the

report of the board of medical officers appointed on that occasion :

“Whatever arguments may be adduced in favor of the rational and temperate use of tobacco by adults, no doubt exists among medical men as to its injurious effects upon the growing organisms and mental powers of the young. Functional derangements of the digestive, circulatory, and nervous systems manifest themselves in the form of headache, confusion of intellect, loss of memory, impaired power of attention, lassitude, indisposition to muscular effort, nausea, want of appetite, dyspepsia, palpitation, tremulousness, disturbed sleep, impaired vision, etc., any one of which materially lessens the capacity for study and application, and most of which are daily subjects of complaint to the medical officers, and form so large a proportion of the sick-lists that the extent of surreptitious indulgence in smoking and chewing may be inferred.

“The recent experiment of permitting smoking at the academy has satisfactorily demonstrated the especial impropriety of the practice at an institution of this character. The further evil of moral contamination from the necessarily unrestrained intercourse and language of the smoking-room was superadded to physical and mental impairment. This apartment became the chosen resort of the leisure hour, its stifling atmosphere injuring health all the more seriously from the intensified form in which the tobacco-fumes were offered for absorption into the system, while outdoor exercise and recreation were proportionately neglected.

“The board have confined themselves in this report to the consideration of the effects of the use of tobacco upon the cadets at this academy. For this reason no mention has been made of certain organic diseases, attributed to the prolonged use of tobacco, or of the serious nervous disorders which sometimes follow its excessive use. In most cases the first and early at-

tempts to smoke or chew produce nausea, vomiting, tremors and prostration. These symptoms lessen in severity as the practice is continued, and usually it is only after protracted habit that perfect tolerance is secured. Should tobacco be allowed, a large number of beginners would be subjected to this experience, a condition of things which would militate against the good effects of the sanitary regulations of this school, which have, in all other respects, maintained so high a standard of health.

"The board are of opinion, therefore, that the regulations against the use of tobacco in any form cannot be too stringent; and, further, that, while smoking should be wholly interdicted, especial care should be exercised to prevent the substitution of chewing, the more deleterious practice.

"Very respectfully, your obedient servants,

"ALBERT L. GIHON,

"*Medical Inspector, U. S. N.*

"ALBERT C. GORGAS,

"*Medical Inspector, U. S. N.*

"GEORGE A. BRIGHT,

"*Surgeon, U. S. N.*

"Rear-Admiral C. R. P. RODGERS, U. S. N.,

"*Superintendent United States Naval Academy.*"

There is no doubt that smoking, especially of cigarettes, and chewing, are still clandestinely practised, to the serious detriment of the physical and mental health of the students. Recently a cadet in hospital was detected in the most extravagant indulgence in chewing, which he confessed to have become already a confirmed habit, and which had markedly affected his appearance and development.

It is perhaps impossible to determine whether malarial poisoning, abuse of tobacco, indigestible food, overheated apartments, faulty ventilation, or protracted clandestine study or

reading by gaslight in rooms closely shaded for concealment, is the chief factor in deteriorating the health of the cadets, nor can their combined influence, which is indicated in the summaries of disease appended to this report, be altogether separated from complaints which are needlessly magnified, imagined, or assumed. A very large proportion of the actual departures from health must be classed as preventable. Of 1,743 cases of cadets unfitted for study and exercise during the past three months, a daily average of 18.9 for the whole quarter, and nearly six per centum of the entire school, fully half ought not to have occurred. Many of these were undoubtedly feigned, especially by cadets unsatisfactory in their studies, to escape recitations and examinations, and by others to evade punishment, but the habitual malingerer is soon identified and is not to be confounded with the "plebe," who has surfeited himself with unaccustomed tarts and sugar candies, or the older classman, who has narcotized himself with tobacco.

A register of physical indisposition kept under each cadet's name has proved of material assistance in indicating the relative frequency of their appearance on the sick and excused lists, and in suggesting the probable character and causes of their actual or alleged sickness.

The administration of the academy is almost paternal in its interest in the welfare of the cadets. Prudential restraints are, perhaps, more strictly exacted than in private life, where a self-willed lad often dresses, eats, and acts as injudiciously as he thinks fit, and where indulgent parents pay little heed to sanitary considerations when their children's fancies are opposed.

A medical officer is always within call, and every case of illness immediately investigated. Such as require quiet and seclusion, not possible in their own rooms, are at once removed to the sick-quarters, where they are under continual professional supervision, and where everything that comfort or care can

require is unstintedly authorized by the Bureau of Medicine and Surgery. This liberality extends even to the care of the teeth, a skilful dental assistant performing every operation for the preservation or repair of these organs, as a sanitary measure of prime importance. No hygienic precaution is neglected, which official foresight can provide; and as the senior medical officer of the station, I take this opportunity of bearing cheerful testimony to the attention which has always been paid to every suggestion or request I have had occasion to make to the superintendent. The existing sanitary defects are not such as can be remedied by the authorities of the school, but require liberal appropriations by Congress for the erection of additional buildings for quarters and for the other purposes herein indicated.

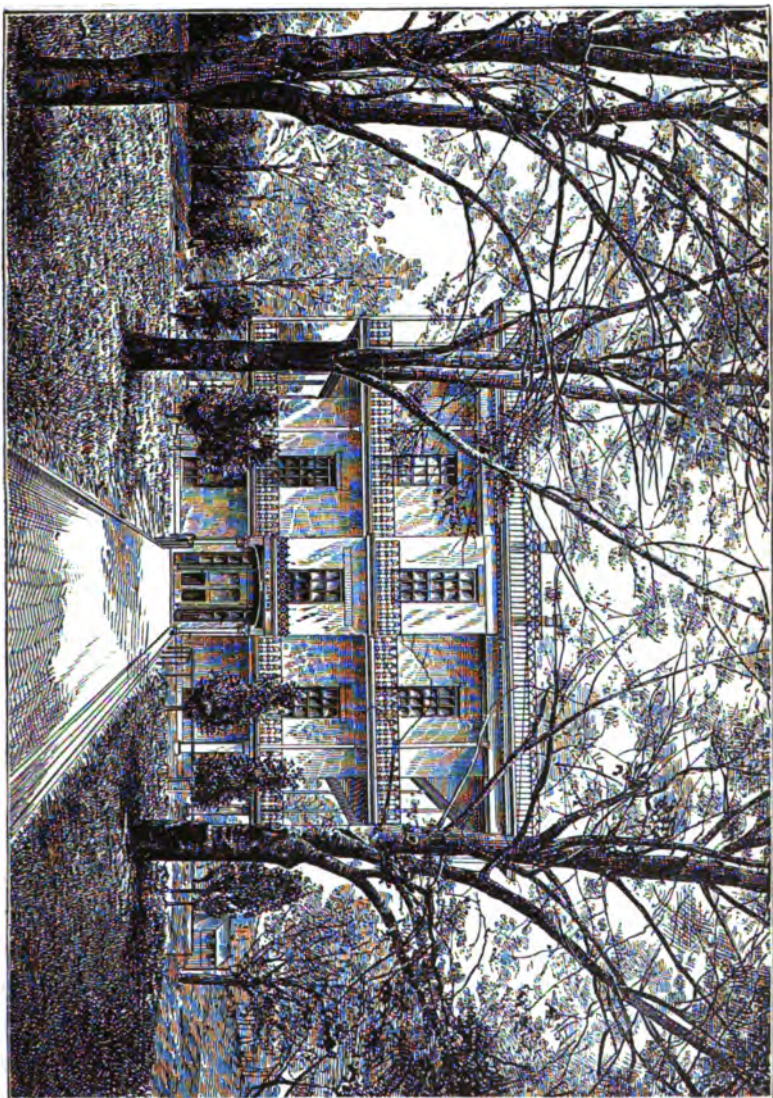
#### HOSPITAL.

The first building used for hospital purposes was a small two-story frame structure, which was erected in 1846 on the parade-ground, between the superintendent's quarters and the large mulberry tree still standing. It contained only four rooms; the two on the upper floor with a small adjoining bath-room were occasionally used for patients; and on the lower floor there were a dispensary and office and reception-room, from which a small store-room was partitioned.

The present building was commenced in 1852, completed in 1853, and occupied in September of that year. It was a brick three-story building, the basement of which was originally used as kitchen, furnace-room, and cellars. On the first floor, to which access was had by a flight of high projecting stone steps, were four rooms, occupied as quarters by the assistant surgeon and the apothecary, and as a general office and reception-room; and on the second floor there were four corresponding rooms intended for wards, and a small dispensary directly over the vestibule.

After the completion of the United States Naval Hospital on





CADET HOSPITAL.



Strawberry Hill, near Annapolis, in 1867, all cases requiring removal from their own quarters were sent there, and these upper rooms were then used as quarters for the senior assistant surgeon and for the sessions of the board of medical examiners.

In 1874 the dispensary was removed to a more convenient and commodious location on the first floor, and the small room thus vacated was converted into an operating-room for the dentist.

About the same time, the senior assistant medical officer was assigned quarters away from the hospital, to permit the accommodation of invalids requiring removal from their own quarters for a few days' hospital care, whom it was inconvenient, and in cold or rainy weather dangerous, to send to the large Naval Hospital on Strawberry Hill. As the examining board was only in session during the vacation or early in the term, these four rooms thus again became available for invalid cadets. In 1875, the dental operating-room was likewise removed to the first floor of the recitation-hall near the old quarters, and a fifth ward established in its place.

The closing of the Naval Hospital on Strawberry Hill, during the past summer, rendering some provision necessary for the accommodation of enlisted men as well as cadets, the Cadet Hospital building was enlarged and extensively altered. With a liberality that cannot be too highly estimated by the medical officers, and with the same excellent taste and sound judgment manifested in the many improvements he has inaugurated in the buildings and grounds elsewhere, the present superintendent, Rear-Admiral C. R. P. Rodgers, has converted this hitherto unsightly structure into one of the most attractive and ornamental buildings within the walls, and one which is, moreover, admirably adapted for its purposes.

The awkward flight of steps in front, leading to the first floor, has been removed, and the main entrance, protected by a handsome iron porch, now opens on the basement, which

has been lowered to the level of the ground, and is kept dry by having the steam-pipes supplying the building conducted through a cellar, excavated under the whole extent of the building as far down as the foundations permitted, and covered with asphalt.

On the right side of the main hall, which is laid with encaustic tiles, is a spacious dispensary, communicating with a well-appointed laboratory, and adjoining, the quarters of the apothecary and a waiting-room for the nurse or messenger on duty; and on the left are the office of the medical inspector, and a room for physical and clinical examinations and minor operations, and for the sessions of medical boards.

A broad iron stair-case ascends to the first floor, on either side of which is a large ward, one for cadets and the other for enlisted men. On the second floor are the one small and four large wards used as heretofore for cadets and officers.

The two general wards on the first floor have each a cubic capacity of 5,344 cubic feet, to which, however, should be added that of the hall (nearly 5,000 cubic feet more), with which they both communicate by two doorways, only partly closed by incomplete blind doors, with transoms above them always kept open, making an aggregate atmospheric space of 15,000 cubic feet for the eight beds here placed.

The four larger rooms on the second floor have each a capacity of 3,024 cubic feet, and the small room 1,372 cubic feet, the latter, however, being practically more than doubled by the communicating hall. For the five beds on this floor, there is an aggregate air-space of 14,585 cubic feet.

Electric bells at each bedside and in every room communicate with an annunciator in the dispensary, with which both the old and new quarters have electric connection. A speaking-tube leading from the hospital to the chamber of the senior assistant medical officer obviates the necessity for his residence within the hospital.

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The addition of a two-story brick building, in the line of the eight-foot projection, containing the water-closets and bath-rooms, has permitted an excellent kitchen on the ground-floor, and above it two large rooms for the storage of bedding, linen, and other hospital supplies.

As further improvements, I would suggest the addition to this back building of another story, in which the store-rooms might be placed; the conversion of the two rooms now used as such into one for ward purposes; the removal of the water-closets and bath-rooms to the extreme rear and exterior to the main walls of the building; and the continuing of the iron stairs to the upper floor.\*

Both the large wards on the first floor will doubtless be required for cadets, and there are manifest objections to having enlisted men in such close proximity with them. The proposed additional ward on this floor (now the store-rooms) will accommodate one or two of the latter, and the Surgeon-General has authorized the transfer of protracted cases to the United States Naval Hospital at Washington, D. C. A small pavilion-ward in the rear of the building will better meet the probable future demand for hospital accommodations for invalid sailors and marines. So many of the former have homes in Annapolis, where they can be treated when sick, that the marines are actually almost the only ones for whom hospital treatment is required. Should proper marine barracks be erected, a pavilion-ward in connection with it would be a necessity.

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\* All these improvements have been carried into effect since the date of this report. The additional story in the back building (third floor) provides a room lighted and ventilated by bay-windows and thoroughly equipped for all purposes of physical examinations and for the sessions of medical boards. The store-rooms have been removed from the second floor of the back building to the attic, and their site converted into a ward for enlisted men. A light iron stairway replaces the former wooden structure, and all the water-closets have been placed in balconies outside the main walls.

## II. CLIMATOLOGY.

Lorin Blodget, the author of "American Climatology", in reporting upon the general climatology of the State of Maryland, locates Annapolis on the isotherm of  $55^{\circ}$ . The mean summer temperature is  $76^{\circ}$ , that of the winter  $35^{\circ}$ , being one degree more in each of these terms than Baltimore, twenty miles to the northward; a degree and a half warmer than Philadelphia, and three degrees warmer than New York. The extreme recorded temperatures have been  $-6^{\circ}$  in January, 1857, a remarkably severe winter, when ice formed in the large rivers and shallow arms of the Chesapeake, and  $105^{\circ}$  in June, 1853.

Regular meteorological observations were begun early in the year, but were necessarily interrupted during the building operations of the past summer. In the confusion attending the removal of furniture, instruments, and papers, and a change of observers, part of the sheet containing the register of observations for June was lost, so that the annual means for 1876 cannot all be calculated. The accompanying table summarizes the observations for eleven months of the year.

The remarkably high degree of saturation during the summer and autumn was a notable phenomenon. The average relative humidity for the month of July was nearly 90 per centum. During 24 days in August it seldom fell below 80, the average for this month, for September and November, being over 76, and for October 72. There was not one cloudless day during the last half of the year. It was a matter of common remark that unused pens and needles rusted, and that damp clothing remained so, and rapidly mildewed if allowed to hang undisturbed in closets. There was a universal complaint of lassitude, malaise, headache, etc., consequent upon the interference with cutaneous evaporation, and an unusual susceptibility to malarial influences.



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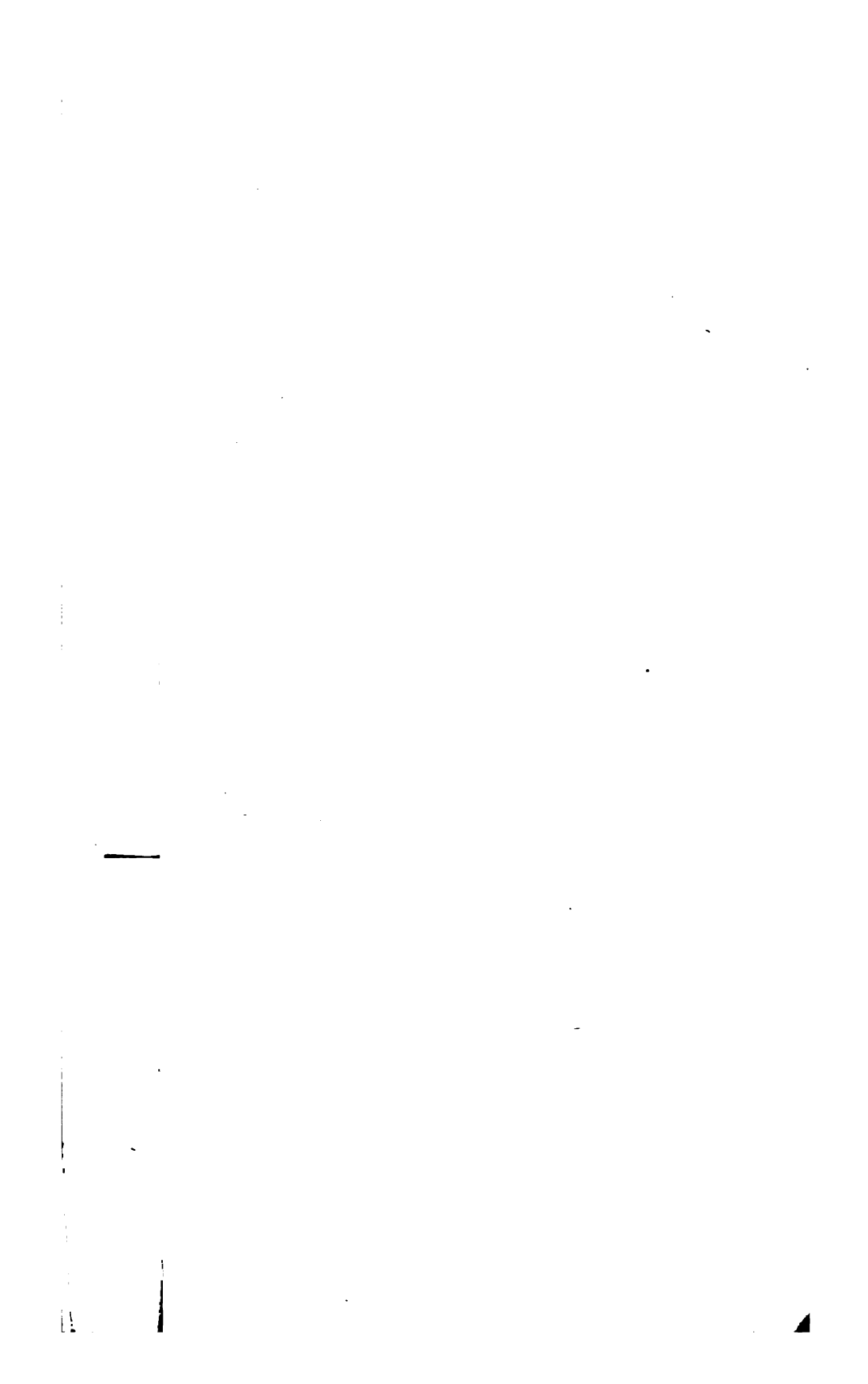
Register of meteorological observations, United States Naval Academy, Annapolis, Md., for the year 1876 (incomplete).

Months.	Thermometer.				Hygrometer.							Weather.				Rainfall. Inch.															
	Daily observation.				Relative humidity at—			Number of days when the daily mean humidity was—				Proportion of sky clear.		Days cloudless or light cirrus.	Rainy days or completely overcast.																
					Lower relative humidity.							10 — cloudless.																			
	S. R.	9 a. m.	3 p. m.	9 p. m.	Daily mean.	Maximum.	Minimum.	S. R.	9 a. m.	3 p. m.	9 p. m.	80-100.	70-80.				60-70.	50-60.	40-50.	30-40.											
January	36.87	39.06	45.79	39.71	40.37	71.5	17	74.4	71.5	69.6	67.1	69.3	30	0	3	6	6	7	4	3	4	3	6	4	2	5	15	1.12			
February	32.67	35.48	42.34	35.70	36.56	64	14	57.1	49.6	56.6	67.2	70.6	9	23	3	6	6	5	7	4	3	3	7	4	2	4	3	16	2.80		
March	35.73	38.56	44.97	38.80	39.51	70	15	74.6	69.3	70.7	71.4	69.9	34	0	1	8	7	6	5	6	5	5	7	6	2	4	3	12	4.19		
April	46.50	51.22	59.76	50.90	52.22	82	32	71.7	70.4	70.9	70.8	68.5	22	1	5	4	12	5	6	11	6	1	4	8	4	3	5	5	8	2.42	
May	50.14	64.27	71.32	63.60	64.58	86	34	67.8	69.6	69.1	67.5	67.1	0	33	0	1	4	8	11	6	1	5	3	5	6	5	2	6	4.40		
June	72.3	77.4	84.0	75.7	77.3																								2.87		
July	74.00	81.09	87.93	79.49	80.86	96	60	89.6	85.5	81.6	80.6	78.5	8	60	0	0	0	0	4	9	5	13	4	4	6	0	6	4	8	4.71	
August	72.90	76.54	81.93	76.03	76.85	91	50	79.6	77.0	77.7	77.6	76.3	46	0	0	0	0	0	7	12	11	1	4	4	5	4	8	2	8	2.81	
September	62.16	68.00	72.27	66.33	68.95	88	47	82.5	77.0	76.0	76.6	76.1	20	0	0	0	0	1	7	8	13	1	3	3	5	4	3	3	11	8.53	
October	47.35	53.29	59.45	52.55	53.66	76	34	75.7	70.6	69.4	67.5	67.1	7	48	0	0	0	5	10	9	5	3	5	5	6	3	5	0	9	2.78	
November	43.30	47.13	51.50	45.90	46.93	76	31	81.0	75.4	69.4	70.9	70.6	4	48	0	0	0	0	8	9	10	3	3	3	3	3	3	3	10	3.24	
December	24.30	27.30	32.70	27.20	27.87	60	9	70.1	65.3	62.2	60.8	60.6	29	2	2	4	4	8	6	6	0	0	3	7	4	9	5	1	2	9	1.10
Rainfall																													40.97		

At 9.15 p. m., of the 29th of January, quite a severe shock of an earthquake was experienced, the barometer at the time standing at 29.819 inches, the thermometer at 30° Fah., the relative humidity being 37, the sky almost cloudless, and the wind from the northwest. A slight rainfall (0.05 inch) had occurred from 11.45 a. m. to 2.45 p. m.

The present winter has thus far been of unusual severity. Although the thermometer has not fallen as low as in 1857, the bay has been blocked with ice, interfering with navigation above Annapolis. The rivers and inlets have been frozen across. Snow first fell on the 26th November, since which time the ground has scarcely been uncovered. The lowest temperature, 6°, occurred during the night of 9th-10th December, the daily mean for the 9th having been 10°. The persistent cold and diminished saturation have in a measure counteracted the debilitating effects of the long-continued excessive humidity of the preceding summer and autumn.

The following table is a summary of all previous meteorological observations in this immediate vicinity to which I have had access. Although irregular and incomplete, the annual means coincide with those quoted from Mr. Blodget :





Year.	Place of observation.	Temperature.				Rainfall.				
		Spring.	Summer.	Autumn.	Winter.	Mean.	Spring.	Summer.	Autumn.	Winter.
		°	°	°	°	°	Inches.	Inches.	Inches.	Inches.
1846-1854	Military post, Annapolis	53.8	75.3	57.8	34.8	55.4	13.15	13.51	10.01	10.57
1857-1859	City of Annapolis	53.9	77.0	57.6	36.2	56.2	13.78	15.24	12.85	11.86
1865-1871	do	52.9	76.2	57.0	35.9	55.5	20.42	14.96	9.36	8.58
1870	Woodlawn, Annapolis, &c.	52.9	76.2	57.0	35.9	55.5	12.08	9.11	7.23	10.82
1874	United States Naval Hospital near Annapolis, Md.	52.1	78.3	56.84	37.9	55.8	8.96	17.27	8.39	7.24
1875	do	52.1	78.3	56.84	37.9	55.8	11.01	10.39	14.55	6.89
1875-1876	United States Naval Academy	52.1	78.3	56.84	37.9	55.8	11.01	10.39	14.55	6.89
		53.1	76.7	57.0	36.2	55.7	Average annual rainfall.....			
	Means.....	53.1	76.7	57.0	36.2	55.7	45.20			

I am indebted to Medical Inspector A. C. Gorgas, U. S. N., for the following abstract from the meteorological register kept at the United States Naval Hospital near Annapolis, during the period, in which it was under his charge, from October, 1873, to June, 1876. The mean annual temperature at this place, on account of its greater exposure to prevailing winds from its higher altitude, was for 1874,  $53^{\circ}.55$ , and for 1875,  $53^{\circ}.52$ , or  $2^{\circ}.2$  less than the corresponding means at the level of the academy. For this reason, these terms have been omitted in the preceding summary, although the rainfall has been incorporated.

[Latitude  $38^{\circ} 59' N.$ ; longitude  $76^{\circ} 30' W.$ ; altitude above the sea, 70 feet.]

Months.	Thermometer.					Hygrometer.					Rain.
	S. R.	9 a. m.	3 p. m.	9 p. m.	Daily mean.	S. R.	9 a. m.	3 p. m.	9 p. m.	Daily mean.	
	°	°	°	°	°	°	°	°	°	°	
1873.											
October	53.7	59.1	63.1	58.0	58.6	50.1	53.9	55.7	53.4	53.3	3.85
November	40.3	43.0	48.0	42.6	43.4	37.1	38.5	42.2	39.3	39.3	3.62
December	38.9	40.8	47.0	41.3	42.0	30.5	37.6	41.9	38.1	38.4	.85
1874.											
January	37.0	38.9	44.4	37.6	39.5	35.0	38.4	39.7	35.6	36.7	2.27
February	33.5	35.5	42.2	36.5	36.9	31.1	32.5	36.9	33.6	33.5	2.14
March	40.2	42.5	49.4	43.4	43.8	37.5	38.4	42.5	39.3	39.2	1.89
April	42.6	46.7	51.0	46.7	46.7	39.9	42.4	44.8	42.8	42.5	6.52
May	57.8	62.6	68.5	62.8	62.9	54.1	57.4	60.5	57.3	57.2	3.67
June	72.8	76.7	81.3	74.9	76.2	68.7	71.1	73.9	70.5	71.0	12.84
July	72.5	77.3	81.9	76.3	77.0	67.9	70.7	72.1	70.9	70.4	4.05
August	65.6	71.4	78.2	71.6	71.8	61.6	64.6	66.7	64.3	64.2	2.22
September	63.8	69.0	75.0	68.1	68.7	61.0	63.7	66.4	63.2	63.3	5.07
October	49.5	54.8	62.9	55.8	55.9	46.9	50.3	54.5	50.5	50.5	.09
November	40.1	43.2	49.9	43.8	44.2	37.5	40.0	43.8	39.7	40.1	2.07
December	34.5	36.6	42.5	37.7	37.8	32.1	33.6	37.6	34.8	34.4	3.65
1875.											
January	25.8	27.2	32.2	29.4	28.6	24.7	26.0	30.9	28.1	27.0	3.39
February	23.9	26.7	33.6	28.5	28.2	23.1	25.7	31.7	26.9	26.9	3.78
March	34.3	36.9	43.3	39.2	38.4	31.8	34.1	39.1	35.9	35.1	4.01
April	41.1	46.9	52.6	46.4	46.8	38.2	42.2	45.5	42.0	41.9	3.76
May	55.7	61.6	69.8	61.4	62.1	51.3	54.1	57.4	54.2	54.2	1.19
June	65.9	72.3	78.0	70.4	71.6	62.9	65.4	66.6	64.9	65.0	4.34
July	71.6	76.5	81.7	75.5	76.3	67.8	69.9	71.9	70.1	69.1	2.43
August	67.7	72.3	77.5	71.7	72.4	65.9	68.3	70.4	68.7	68.2	10.50
September	59.0	65.0	72.3	63.4	64.9	56.3	59.3	62.3	58.7	59.2	2.52
October	48.6	54.0	61.6	54.1	54.6	45.7	48.7	53.3	49.5	49.3	1.56
November	38.4	41.1	45.3	41.2	41.5	35.9	37.8	40.2	37.8	37.9	4.31
December	34.1	36.0	39.7	37.7	36.9	32.5	34.2	36.9	35.7	34.8	2.97
1876.											
January	36.9	39.0	45.6	40.1	40.4	34.0	35.9	40.6	36.6	36.9	1.40
February	32.4	35.0	41.9	36.3	36.3	30.4	32.5	37.9	34.2	33.7	2.87
March	35.2	37.6	44.5	39.2	39.1	32.7	34.2	39.0	35.9	35.4	5.30
April	45.0	49.8	58.1	50.4	40.5	40.5	43.6	47.9	44.9	44.2	2.80
May	57.0	62.2	69.2	61.5	62.5	53.7	55.9	60.1	56.7	54.9	4.95
June	70.1	75.2	81.8	73.5	75.1	66.1	67.8	70.8	68.4	68.3	2.87







*Mean of three daily observations at Woodlawn, Fallstown, Annapolis, Woodstock College, and Saint Mary's, during the year 1870.*

Months.	Temperature.			Rain and melted snow.
	Maximum.	Minimum.	Mean.	
	°	°	°	In.
January .....	63	16	39.3	3.38
February .....	56	9	34.6	3.49
March .....	62	22	40.4	9.88
April .....	84	34	53.4	5.58
May .....	85	51	64.8	4.96
June .....	95	59	74.0	7.64
July .....	95	60	78.4	4.36
August .....	90	60	75.8	2.96
September .....	85	53	67.9	4.08
October .....	79	40	57.2	3.39
November .....	69	26	46.0	1.89
December .....	61	6	34.0	1.71
Means .....	72.83	36.33	55.5	46.32

### III. MEDICAL TOPOGRAPHY.

The United States Naval Academy is situated within the precincts of the old city of Annapolis, the capital of the State of Maryland, at the mouth of the Severn River, a navigable estuary of Chesapeake Bay, one hundred and twenty miles from the Atlantic Ocean. It lies in latitude  $38^{\circ} 58' 52''$  N., and longitude  $76^{\circ} 29' 22''.5$  W. from Greenwich, just south of the cretaceous formations of Anne Arundel County, in the alluvial or tide-water district, which forms nearly one-half the territory of the State, on a fertile soil composed of beds of marl, shell-lime, and greensand, in nearly horizontal, interrupted strata, but slightly elevated above the level of the sea. Iron-ore clay abounds, giving its characteristics to the soil bordering the river; and along the line of the Annapolis and Elk Ridge Railroad the metal is found in workable quantity.

The seat of government of the State was removed, in 1691, from Saint Mary's to Providence, which, since that date, has been called Annapolis. Until the Revolution, this was one of

the most important cities in the Colonies, boasting its aristocratic and refined society, its stately mansions, and the unequalled number of its splendid equipages.

The land on which the Naval Academy is located has been the property of the United States Government since 1808, when the War Department established Fort Severn at this point. It continued a military post until 1845, in which year the fort and its immediate surroundings were transferred to the Navy Department as a site for a naval school. Subsequent purchases have greatly enlarged this original tract of nine acres. Fifty acres are now inclosed within the walls, while the jurisdiction of the academy also extends over two detached but contiguous portions of still greater extent, namely, an unoccupied lot of ten acres adjoining the grounds of Saint John's College; and connected with this lot by a bridge over Graveyard Creek, which separates it from the municipality of Annapolis, a farm of sixty-seven acres on Strawberry Hill. The extreme bluff of this farm, fronting the academy, is the picturesque and appropriate site of the Naval Cemetery.

Beyond and adjoining "the Farm" are the grounds, thirty acres in extent, of the United States Naval Hospital, near Annapolis, which was erected in 1867 and closed during the past summer. On the opposite bank of the Severn, at the site of the former Fort Madison, the Naval Experimental Battery occupies a tract of about one hundred acres.

Like other marshy borders of the shallow estuaries of the numerous bays indenting our Southern Atlantic coast, this vicinity has an undeniably miasmatic character. The improved drainage of the grounds has done a great deal towards moderating the malarial influence, but those who remain at the academy the entire year are subject in the autumn, and less so in the spring, to torpidity of liver, with jaundiced complexions, matutinal headaches, malaise, neuralgias, and not unfrequently

actual explosions of fever and ague. Attacks of intermittent fever are, however, not more common than at many other reputedly healthy places. They are less so than in the city of Washington, near the Potomac, and if we can judge from the following, also less than at the United States Military Academy at West Point, N. Y., for though the size of the respective establishments is necessary for precise comparison, the excess in numbers is probably on the side of the Naval Academy.

Place.	1872-'73.			1873-'74.		
	Intermittent fever.	Other fevers.	Total.	Intermittent fever.	Other fevers.	Total.
United States Military Academy, West Point:						
Cadets .....	176	64	240	127	71	198
Garrison .....	64	21	85	51	13	64
Total .....	240	85	325	178	84	262
United States Naval Academy, Annapolis:						
Cadets, officers, and enlisted men .....	54	3	57	101	2	103

Annapolis is too thinly settled to have any very decided urban influence upon the academy. It occupies a small peninsula, less than a mile across the narrowest portion of the neck, with an extensive water-front on Spau Creek, on the harbor, on the Severn River, and on Graveyard Creek; and this, with the peculiar arrangement of its streets, which radiate from two adjoining circles, in the centers of which are the State-house and Saint Ann's Protestant Episcopal Church, secures the free passage of the wind from every point of the compass. The wider streets are well shaded with large trees, principally maples, locusts, and silver poplars, which are not too close to exclude the sun at all hours of the day. They are tolerably well drained, but the scavengering is neglected, particularly on Hanover street, bordering the academy grounds, where the residents

have thrown ashes and other household refuse, until the grade of the street has been altered.\*

A slaughter-house (indicated both on the map of the academy and that of the city) on Hanover street at the corner of Tabernacle street, is an additional nuisance. A case of scarlet fever occurring at No. 14 of the officers' quarters, in direct range from this establishment, suggested an inquiry with respect to the prevalence of this disease in the vicinity, and though a considerable number of cases were found to have recently occurred on Hanover and Wagner streets, there was not sufficient evidence to trace their causation directly to this spot. The residents, however, complain that when animals are slaughtered the blood is allowed to run into the street gutters and find its way along the surface, with refuse water, to Wagner street, and thence into the river. It is probable that, in accordance with the views of Carpenter and Budd respecting the animal origin of scarlatina, which have been recently sustained by the investigations of Dr. John Morris as to the causes of scarlet fever in Baltimore and Belair, Md., this disease will be found to have some direct relationship to the decomposition of animal matter, though that may not be exclusively the blood of vertebrates.

The city gas-works are located on the piece of land intervening between the inclosed portion of the academy grounds and the unoccupied ten-acre lot adjoining Saint John's College. The refuse gas-liquor accumulates in a stagnant pond, overflowing into the river, and with the wind from that quarter, the offensive fumes of the gas manufacture are carried directly into the new quarters, hospital, and neighboring officers' residences. On this account, as well as to make the territory of the academy continuous with that across Graveyard Creek and adjoin-

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\* The Navy Department has, since the date of this report, regraded and paved both Hanover and Wagner streets along the entire extent of the Academy walls.

ing the college, it is desirable that this small slip should be acquired by the government. This would have the still greater benefit of ridding the academy of the vicinity of a collection of low negro shanties, termed Lockwoodville, and of a number of disreputable houses on Wagner street, facing the new quarters, which there is good reason to believe are visited by cadets.

#### IV. MEDICAL STATISTICS.

Satisfactory statistics of disease in the city of Annapolis are not available.

The following tables represent the movement of disease on the station since the establishment of the Naval Academy in 1845, including for comparison its temporary removal to Newport, R. I., from 1861 to 1865.

As I have explained already, these numbers indicate only those cases which have been considered serious enough to be recorded in detail, and do not, therefore, give a completely accurate indication of the minor ailments or degrees of ailment, which represent climatic influences or improper sanitary conditions. They measure only the culminations of these influences in disease.

The custom has, heretofore, been to include cadets, officers, enlisted men, and attendants in one general report, so that no opinion can be formed as to the special departures from health to which the former are peculiarly subject. I have instituted a system with the beginning of this year (1877) which will, hereafter, faithfully represent the health record of each cadet, as well as the effects of morbid influences on students, officers, and others separately. A complete and continuous health-history of the cadets should also embrace the period of their absence from the station on leave or on board the practice-ships.

The nomenclature of diseases now required by the instructions for the government of medical officers of the Navy dates

only from 1873. Prior to that time, various nosological systems had been in operation. The individual peculiarities of the several recorders are also manifest in these older records, as where minor complaints are differently classified, one medical officer placing all colds under the caption "catarrhus," another under "bronchitis acuta," one making "constipatio" cover multitudinous gastro-intestinal disorders, while another has a heavy quarterly exhibit of "dyspepsia," his successor distributing similar cases among "indigestion," "colic," "gastric irritation," etc.

It is to be regretted that appropriate terms are not prescribed by regulation for those milder forms of deranged health which form so large a portion of naval and military sick-lists, and which civilian practitioners scarcely dignify as recordable diseases, and hospital physicians never encounter. Such complaints are now often registered by terms properly characterizing only serious affections, merely because there is no other place obvious where they can be grouped. Until this is obviated that uniformity of record which is requisite to give real value to statistics is not possible.





*Summary of cases of sickness recorded annually, &c.—Continued.*

Disease.	1845.	1846.	1847.	1848.	1849.	1850.	1851.	1852.	1853.	1854.	1855.	1856.
<b>CLASS IV.—LOCAL DISEASES—Cont'd.</b>												
<i>Order VIII.—Diseases of the urinary and genital system—Continued.</i>												
Hydrocele .....												
Spermatorrhœa .....												1
Urethra strictura .....		1		1	1							
Varicocele .....												
Hydrocele of the cord .....												
Balanitis .....												
<i>Order IX.—Diseases of the locomotive system.</i>												
Ankylosis .....												
Hydrops articularum .....												
Necrosis .....				1								
Periostitis .....												
Synovitis .....												
Muscular contraction .....												
<i>Order X.—Diseases of the integumentary system.</i>												
Abscessus .....			3	5	1	2	5	18	16		8	11
Acne .....										9		
Adenitis .....					6							
Anthrax .....										6		
Ecthyma .....												
Eczema .....												
Erythema .....												
Furunculus .....				2		1		5				1
Herpes .....												
Lichen .....												
Paronychia .....								1				1
Pemphigus .....												
Pernio .....												
Onychia .....												
Prurigo .....												
Psoriasis .....											1	
Urticaria .....												
Unguis involutis .....						2	2	1			1	1
Ulcus .....		1	5	2		1	3		10	1	3	1
Morbi cutis ? .....			4					2	1			
<b>CLASS V.—NON-MALIGNANT TUMORS AND CYSTS.</b>												
Tumor .....												1
<b>CLASS VI.—VIOLENT DISEASES AND DEATHS.</b>												
<i>Order I.—Wounds, injuries, and accidents.</i>												
Abrasio .....												
Ambustio .....			1	1	1							
Concussio cerebri .....												
Contusio .....		1	9	8	9	3	4	17	12	3	2	2
Fractura .....									2	2		1
Hernia .....					2			1	2			
Luxatio .....								5	4		1	
Hernia humoralis .....								1				
Stemma .....	1		7	1	2	6	3		3			6
Submersio .....												
Venenatio .....		1						1				
Vulnus contusum .....							1			4	3	5

*Summary of cases of sickness recorded annually, &c.—Continued.*

Diseases.	1845.	1846.	1847.	1848.	1849.	1850.	1851.	1852.	1853.	1854.	1855.	1856.
<b>CLASS VI.—VIOLENT DISEASES AND DEATHS—Continued.</b>												
<i>Order I.—Wounds, injuries, and accidents—Continued.</i>												
Vulnus incisum .....			1	1	1	3	2	21	16	5	1	1
Vulnus laceratum .....			3			1	5	7	5	6		
Vulnus punctum .....			4	3	1	1	2				1	
Vulnus sclopetarium .....			1	2			1			1		
Morbi varii .....			3	5	5							
Total .....	29	208	348	419	361	140	126	321	347	265	208	274
Deaths .....									1	1		1

*Summary of cases of sickness recorded annually, &c.—Continued.*

[illegible]

*Summary of cases of sickness recorded annually, &c.—Continued.*

[illegible]



[illegible]

## Summary of cases of sickness recorded annually, &amp;c.—Continued.

Diseases.	1887.	1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.
Newport, R. I.									
CLASS IV.—LOCAL DISEASES—Continued.									
Order VI.—Diseases of the respiratory system.									
Asthma						1	1	4	
Bronchitis acuta	7	8	2			1	2	11	13
Bronchitis chronica									
Catarrhus	79	135	69	149	32	4	41	130	212
Epistaxis						1	2	2	1
Laryngitis	1			7					2
Phthisis pneumonica acuta									
Phthisis pneumonica chronica		1		*4		2		*2	*1
Pleuritis	1							1	2
Pneumonia			1			2	*2	*5	5
Hæmoptysis		2	2	1					1
Angina simplex	1								
Order VII.—Diseases of the digestive system.									
Ascites								2	1
Cholera morbus		1							
Congestion of liver	3								
Colica	9	6	10	6		6	9	11	30
Constipatio	27	20	46	32	6	2	8	39	79
Diarrhœa acuta	49	75	54	28	18	22	12	55	45
Diarrhœa chronica									
Dysenteria acuta	1					2	2	7	
Dysenteria chronica							1		
Dyspepsia	4	6	7	2	15	11	27	24	16
Enteritis									
Fistula in ano									1
Gastritis								4	
Hæmatemesia								1	
Hæmorrhoids			2	3				1	2
Hepatitis acuta								1	
Hepatitis chronica									
Icterus			1			3		1	4
Peritonitis									
Pharyngitis									
Prolapsus ani									
Splenitis									
Stomatitis	1							2	
Tonsillitis	22	40	21	29	18	47	102	143	60
Bilious disorder									
Disordered stomach	7	11							
Disordered bowels									
Nausea									
Gastro-enteritis									
Glossitis									
Ranula									
Order VIII.—Diseases of the urinary and genital system.									
Albuminuria									
Calculus									
Cystitis									
Diabetes									
Dysuria						1			
Ischuria									
Nephritis									
Orchitis	2					2		1	
Phymosis	1								



Diseases.	1867.	1868.	1869.	1870.	1871.	1872.	1873.	1874.	1875.
<b>CLASS IV.—LOCAL DISEASES—Continued.</b>									
<i>Order VIII.—Diseases of the urinary and genital system—Continued.</i>									
Enuresis .....				1					1
Hæmaturia.....							3		
Hydrocele.....									
Spermatorrhœa..	2	1	1					1	1
Urethræ strictura		1					1		
Variocoelè.....									1
Hydrocelé of the cord				1					
Balanitis.....									1
<i>Order IX.—Diseases of the locomotive system.</i>									
Ankylosis.....				1			1		
Hydrops articuli....						1	1		
Necrosis.....									1
Periostitis.....									
Synovitis.....				1					
Muscular contraction								8	
<i>Order X.—Diseases of the integumentary system.</i>									
Abscessus.....	5	8	1		1	1	2	7	2
Acne.....									
Adenitis.....							1	1	1
Anthrax.....			1	1	1				
Ecthyma.....									
Eczema.....							17	4	3
Erythema.....									
Furunculus.....	14	1	10	16	2	6	19	31	20
Herpes.....			1	1			1		2
Lichen.....								1	
Paronychia.....									
Pemphigus.....		3		3		4	2	4	3
Pernio.....									
Onychia.....								1	
Prurigo.....		1	1	1				2	1
Psoriasis.....	1	1							
Urticaria.....		3	2				1		1
Ungula involutis..									
Ulcus.....				1			2	3	6
Morbi cutis?									1
<b>CLASS V.—NON-MALIGNANT TUMORS AND CYSTS.</b>									
Tumor.....									
<b>CLASS VI.—VIOLENT DISEASES AND DEATHS.</b>									
<i>Order I.—Wounds, injuries, and acci- dents.</i>									
Abrasio.....							1		1
Ambustio.....	1	1	1					2	1
Concussio cerebri..									
Contusio.....	14	9	7	10	6	3	1	15	20
Fractura.....			1	1			*2		2
Hernia.....			1						1

Summary of cases of sickness recorded annually, &c.—Continued.

Diseases.	1857.	1858.	1859.	1860.	1861.	1862.	1863.	1864.	1865.
Newport, R. I.									
CLASS VI.—VIOLENT DISEASES AND DEATHS—Continued.									
Order I.—Wounds, injuries, and accidents—Continued.									
Luxatio .....		2					2		
Hernia humoralis .....									
Stremma .....	4	3	7	6	7	3	8	13	4
Submersio .....									3
Venenatio .....									1
Vulnus contusum .....		1			6	1	4	9	1
Vulnus incisum .....	2		1	2			2	2	2
Vulnus laceratum .....									
Vulnus punctum .....								2	1
Vulnus sclopetarium .....									
Morbi varii .....									
Total .....	878	444	321	405	277	369	717	894	957
Deaths .....				1		2	6	1	5

*Summary of cases of sickness recorded annually, &c.—Continued.*

Diseases.	1866.	1867.	1868.	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.
<b>CLASS I.—ZYMOTIC DISEASES.</b>											
<i>Order I.—Miasmatic diseases.</i>											
Catarrhus epidemicus .....	2										
Cynanche parotidea .....	23	20	2	6					1		
Diphtheria .....							*1				
Erysipelae .....			4	3		3	1	4			1
Febris continua simplex .....		2	6								
Febris enterica .....	*46			1			4			2	
Febris intermittens .....	197	239	211	65	172	152	96	85	58	57	63
Febris remittens .....	26	82	20	*11	*24	8	2			*1	13
Febris typhus .....											
Morbilli .....				8			1	2			
Pertussis .....											
Scarlatina .....		7							2		
Varicella .....		1								2	
Varicela .....							*1				
Varioloides .....											
Vaccinia .....						16	4	5			
<i>Order II.—Euthetic diseases.</i>											
Syphilia primitiva .....		4	3		2	1	1		4	3	2
Syphilia consecutiva .....	2	1	6		4		1	2			
Gonorrhoea .....	4	7	5	3		4	1	1	4	2	8
Ophthalmia gonorrhoeica .....											
<i>Order III.—Dietic diseases.</i>											
Alcoholismus .....									10	9	4
Delirium tremens .....		4	5	4	2					1	1
Ebriositas .....						1		1			
Purpura .....											
Plethora .....	1	1									
<b>CLASS II.—CONSTITUTIONAL DISEASES.</b>											
<i>Order I.—Dinathetic diseases.</i>											
Adynamia .....	15	81	7	5	3	6	16	24	12	5	14
Anæmia .....	2	3	1		4	2	3			1	
Carcinoma .....											
Gangræna senilis .....										*1	
Hydrops (Anasarca) .....	1		1								
Podagra .....											
Rheumatismus acutus .....	59	21	26	12	19	40	14	13	21	9	4
Rheumatismus chronicus .....	4	18	24	2	1	2	4	4	14	9	26
Malaise .....											
<i>Order III.—Tubercular diseases.</i>											
Scrofula .....											
Tuberculosis .....											1
<b>CLASS III.—PARASITIC DISEASES.</b>											
Scabies .....	27	21									
Verues .....	2	1	2	1		2					
Pediculus pubis .....										1	
<b>CLASS IV.—LOCAL DISEASES.</b>											
<i>Order I.—Diseases of the nervous system.</i>											
Apoplexia .....		*1			1		*1				
Cephalalgia .....	158	118	62	39	9	46	74	109	82	109	58
Cerebritis .....	1			1							

*Summary of cases of sickness recorded annually, &c.—Continued.*

Diseases.	1866.	1867.	1868.	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.
<b>CLASS IV.—LOCAL DISEASES—Continued.</b>											
<i>Order I.—Diseases of the nervous system—Continued.</i>											
Chorea .....											
Dementia .....										1	1
Epilepsia .....		2	3	2	1	4		1		3	1
Insolatio .....					1				3		
Irritatio spinalis .....		1									
Mania .....			1								
Melancholia .....	1	1								2	
Meningitis .....											
Myelitis .....											
Neuralgia .....	112	89	72	39	24	20	34	20	11	24	26
Paralysis .....									1		1
Pleurodynia .....	1										1
Hypochondriasis .....											
Nervous irritability .....											
Vertigo .....							5	1			2
<i>Order II.—Diseases of the eye.</i>											
Amaurosis .....	6	2	1	1	1	3			5		2
Asthenopia .....									1	8	1
Conjunctivitis .....	18	13	10	4		7	13	101	17	12	5
Fistula lachrymalis .....				2							
Keratitis .....										1	
Iritis .....			2					1			
Nyctalopia .....							3				
Ophthalmia .....	6	2	14	3	1	6	11	26	1		1
Pterygium .....	1	5									
Retinitis .....	2	2			1	1			1		
Hordeolum .....											3
Mydriasis .....										1	
<i>Order III.—Diseases of the ear.</i>											
Otalgia .....	9								3	1	3
Otitis .....	6	12	14			4	6	5	3	8	4
Otorrhoea .....	6										
Surditas .....									1		
Tympanitis .....											
<i>Order IV.—Diseases of the teeth.</i>											
Odontalgia .....	9							1	1	3	1
Hemorrhage after extraction .....											
<i>Diseases of the nose.</i>											
Ozæna .....		1				4					
<i>Order V.—Diseases of the circulatory system.</i>											
Aneurysma .....		1									
Angina pectoris .....		4				2	1				
Hypertrophia cordis .....											
Palpitatio .....		3			2	2	3		2	3	1
Pericarditis .....					1						
Varix .....								1			
<i>Order VI.—Diseases of the respiratory system.</i>											
Asthma .....	3		2	2			2				
Bronchitis acuta .....	40	11	13	15	33	13	10	7			

*Summary of cases of sickness recorded annually, &c.—Continued.*

Diseases.	1866.	1867.	1868.	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.
<b>CLASS IV.—LOCAL DISEASES—Continued.</b>											
<i>Order VI.—Diseases of the respiratory system—Continued.</i>											
Bronchitis chronica .....		6	1	1	2	1	1				
Catarrhus .....	168	179	120	64	43	89	148	135	151	279	296
Epistaxis .....							1				1
Laryngitis .....					2	2		3	1		
Phthisis pneumonica acuta .....								3	1		
Phthisis pneumonica chronica .....	1	*9	*7	3		4	*6	2	*2		
Pleuritis .....	11	*10	4	4	1	5	3	1	13	2	1
Pneumonia .....	*6	***6	*1		*4	3				1	*3
Hæmoptysis .....				1	1	2	1	2		2	1
Angina simplex .....											
<i>Order VII.—Diseases of the digestive system.</i>											
Ascites .....	1										
Cholera morbus .....	4		2	6	7	5	3		1	7	3
Congestion of liver .....											
Colica .....	15	8	12	10	13	11	25	39	29	23	31
Constipatio .....	65	30	28	52	41	22	62	63	26	8	2
Diarrhœa acuta .....	175	81	118	58	52	24	61	89	109	158	129
Diarrhœa chronica .....		14	2	1							
Dysenteria acuta .....	15	2	2	4	1	2	2				
Dysenteria chronica .....		3		1		3					
Dyspepsia .....	37	23	49	8	9	32	25	25	9	12	7
Enteritis .....				2							
Fistula in ano .....	1	2	2				1				
Gastritis .....	8	3		1	3	1					
Hæmatemesis .....											
Hæmorrhœis .....	3	4	8	1	3	4	8	5	11	4	3
Hepatitis acuta .....	1		1								
Hepatitis chronica .....		1	1		*1						1
Icterus .....		*1	1	1		1		1		1	1
Peritonitis .....	1	4									
Pharyngitis .....						2					4
Prolapsus ani .....					1						
Splenitis .....			1								
Stomatitis .....			3								
Tonsillitis .....	105	71	87	24	42	37	27	59	60	63	28
Billous disorder .....											
Disordered stomach .....											
Disordered bowels .....											
Nausea .....											
Gastro-enteritis .....											
Glossitis .....						1					
Ranula .....											
<i>Order VIII.—Diseases of the urinary and genital system.</i>											
Albuminuria .....					1						1
Calculus .....											
Cystitis .....					1		1				
Diabetes .....		1									
Dysuria .....						1					
Ischuria .....		1									
Nephritis .....	2	1	1								
Orchitis .....	4	2	4	3	2		1	6	4	1	3
Phymosis .....											
Enuresis .....								1			
Hæmaturia .....											
Hydrocele .....											1
Spermatorrhœa .....								1			

*Summary of cases of sickness recorded annually, &c.—Continued.*

Diseases.	1866.	1867.	1868.	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.
<b>CLASS IV.—LOCAL DISEASES—Continued.</b>											
<i>Order VIII.—Diseases of the urinary and genital system—Continued.</i>											
Urethræ strictura .....						2	2	1		1	
Varicocele .....			2								
Hydrocele of the cord .....											
Balanitis .....											
<i>Order IX.—Diseases of the locomotive system.</i>											
Ankylosis .....											
Hydrops articulorum .....											
Necrosis .....											
Periostitis .....		1									
Synovitis .....	1		1					2	1	1	1
Muscular contraction .....											
<i>Order X.—Diseases of the integumentary system.</i>											
Abcessus .....	9	35	19	8	8	8	5	15	6	12	12
Acne .....										1	
Adenitis .....		2	2		2	2	4	2	2	3	2
Anthrax .....	2	3					1				
Ecthyma .....		1									
Eczema .....				2		1			1		
Erythema .....						1				1	
Furunculus .....	35	30	52	44	30	14	20	9	4	11	9
Herpes .....		1		1	2		1	12	1		1
Lichen .....			7								
Paronychia .....	3	4	7	6	3	1	2		1	2	1
Pemphigus .....			1			1	2	1			1
Pernio .....		1						2		3	1
Onychia .....		1									3
Prurigo .....											
Psoriasis .....		1									
Urticaria .....						1				2	1
Unguis involutis .....											
Ulcus .....	3	6	14	6	4	3	9	5	2	1	
Morbi cutis ? .....											
<b>CLASS V.—NON-MALIGNANT TUMORS AND CYSTS.</b>											
Tumor .....	3	5		2	2		1	1			
<b>CLASS VI.—VIOLENT DISEASES AND DEATHS.</b>											
<i>Order I.—Wounds, injuries, and accidents.</i>											
Abrasio .....	21	8	4	2	1	6	8	10	1		
Ambustio .....	4	**8	2	1			3	3	3	3	4
Concussio cerebri .....	2	**2			*1			1	1	1	1
Contusio .....	49	31	34	17	22	23	36	34	24	35	13
Fractura .....	4	7	2	2	1	5	3		4	3	3
Hernia .....		2	2		2	5	3		1	2	3
Luxatio .....	4	1	1			3					1
Hernia humoralis .....											
Stremma .....	24	28	24	16	16	10	21	25	35	34	16
Submersio .....					*1	*1				*1	*1
Venenatio .....											
Vulnus contusum .....	19	9	14	5	3	3	6	7	11	5	7

*Summary of cases of sickness recorded annually, &c.—Continued.*

Diseases.	1866.	1867.	1868.	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.
<b>CLASS VI.—VIOLENT DISEASES AND DEATHS—Continued.</b>											
<i>Order I.—Wounds, injuries, and accidents—Continued.</i>											
Vulnus incisum .....	9	17	11	4	2	8	5	14	9	2	1
Vulnus laceratum .....	1	1	7	1	1	4		2	1	3	2
Vulnus punctum .....	4	11	1	1	1		2	5	2	3	2
Vulnus sclopetarium .....	1			2	1	1				2	
Morbi varii .....											
Total .....	1,571	1,459	1,179	594	639	704	820	1,003	785	974	847
Deaths .....	3	11	2	1	5	1	3	1	1	3	2

## Aggregate of recorded cases of sickness occurring at United States Naval Academy.

Diseases.	At Annapolis, Md., Oct. 1845, to Apr., 1861, 15 years and 7 months.		At Newport, R. I., May, 1861, to Sept., 1865, 4 years and 5 months.		At Annapolis, Md., Oct. 1865, to Dec. 1876, 11 years and 3 months.		Total at Annapolis, Md., 26 years and 10 months.		Whole number, 31 years and 3 months.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
<b>CLASS I.—ZYMOTIC DISEASES.</b>										
<b>Order I.—Miasmatic diseases.</b>										
Catarrhus epidemicus.....	3	.....	.....	.....	8	.....	11	.....	11	.....
Cyanche parotidea.....	25	.....	.....	.....	52	.....	77	.....	77	.....
Diphtheria.....	3	.....	1	.....	1	1	4	1	5	1
Erysipelas.....	13	.....	2	.....	16	.....	29	.....	31	.....
Febris continua simplex.....	46	.....	8	.....	8	.....	64	.....	62	.....
Febris enterica.....	.....	.....	2	1	18	3	18	3	20	4
Febris intermittens.....	328	1	59	.....	1,457	.....	1,785	1	1,854	1
Febris remittens.....	16	.....	8	.....	191	3	207	3	215	3
Febris typhus.....	.....	.....	5	3	.....	.....	.....	.....	5	3
Morbilli.....	4	.....	.....	.....	11	.....	15	.....	15	.....
Pertussis.....	1	.....	.....	.....	.....	.....	1	.....	1	.....
Scarlatina.....	.....	.....	9	1	9	.....	9	.....	18	1
Varicella.....	4	.....	.....	.....	3	.....	7	.....	7	.....
Variola.....	.....	.....	.....	.....	1	1	1	1	1	1
Varioloides.....	.....	.....	.....	.....	1	.....	1	.....	1	.....
Vaccinia.....	1	.....	.....	.....	25	.....	26	.....	26	.....
<b>Order II.—Enthetic diseases.</b>										
Syphilis primitiva.....	14	.....	4	.....	20	.....	24	.....	38	.....
Syphilis consecutiva.....	21	.....	.....	.....	17	.....	38	.....	38	.....
Gonorrhoea.....	46	.....	7	.....	35	.....	81	.....	88	.....
Ophthalmia gonorrhoeica.....	1	.....	6	.....	.....	.....	1	.....	1	.....
<b>Order III.—Diætic diseases.</b>										
Alcoholismus.....	1	.....	.....	.....	23	.....	24	.....	24	.....



Delirium tremens.....	2	3	17	20	23
Ebrietas.....	5	.....	2	7	7
Purpura.....	1	.....	1	1	1
Plethora.....	1	8	2	3	6
CLASS II.—CONSTITUTIONAL DISEASES.					
Order I.—Diathetic diseases.					
Adynamia.....	11	20	191	202	222
Anemia.....	2	.....	16	18	18
Carcinoma.....	.....	1	.....	.....	1
Gangrena senilis.....	.....	1	1	1	1
Hydrops (Anasarca).....	3	.....	2	2	3
Podagra.....	72	58	238	310	368
Rheumatismus acutus.....	52	20	116	168	188
Rheumatismus chronicus.....	7	.....	.....	7	7
Malaise.....	.....	.....	.....	.....	.....
Order III.—Tubercular diseases.					
Scrofula.....	2	.....	.....	2	2
Tuberculosis.....	.....	.....	1	1	1
CLASS III.—PARASITIC DISEASES.					
Scabies.....	.....	1	48	48	49
Verues.....	7	.....	8	15	15
Pediculus pubis.....	.....	.....	1	1	1
CLASS IV.—LOCAL DISEASES.					
Order I.—Diseases of the nervous system.					
Apoplexia.....	.....	394	3	3	3
Cephalalgia.....	239	.....	912	1,151	1,545
Cerebritis.....	4	.....	2	2	2
Chorea.....	.....	.....	4	4	4
Dementia.....	.....	.....	2	2	2
Epilepsia.....	2	3	18	20	23
Insolatio.....	.....	.....	4	4	4
Irritatio spinalis.....	2	.....	1	3	3
Mania.....	1	1	1	3	3
Melancholia.....	2	2	4	6	8
Meningitis.....	2	1	.....	2	2
Myelitis.....	2	.....	.....	1	1
Neuralgia.....	49	94	486	535	629
Nervous irritability.....	2	.....	.....	2	2



*Order IV.—Diseases of the teeth.*

Odontalgia.....	64	16	15	79	95
Hemorrhage after extraction.....	1			1	1

*Diseases of the nose.*

Ozena.....	4		5	9	9
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*Order V.—Diseases of the circulatory system.*

Aneurysm.....	3		1	4	4
Angina pectoris.....	6		8	14	14
Hypertrophie cordis.....		1			1
Palpitation.....	6	3	16	22	25
Pericarditis.....	1		1	2	2
Varix.....			1	1	1

*Order VI.—Diseases of the respiratory system.*

Asthma.....	38	6	9	9	15
Bronchitis acuta.....	1	42	151	180	231
Bronchitis chronica.....	929	13	13	14	14
Catarrhus.....	44	529	1,690	2,619	3,148
Epistaxis.....	11	6	2	46	52
Laryngitis.....		2	12	23	25
Phthisis pneumonica acuta.....			4	4	4
Phthisis pneumonica chronica.....	5	5	35	40	45
Pleuritis.....	11	5	56	67	72
Pneumonia.....	7	14	24	31	45
Hemoptysis.....	19	3	7	7	10
Angina simplex.....	1	1	10	29	30
				1	1

*Order VII.—Diseases of the digestive system.*

Ascites.....	24		1	1	1
Cholera morbus.....	4	3	38	62	65
Congestion of the liver.....	127			4	4
Colica.....	284	62	218	345	407
Constipation.....	568	135	431	715	850
Diarrhoea acuta.....	25	177	1,096	1,664	1,841
Diarrhoea chronica.....	33	11	17	42	42
Dysenteria acuta.....	3	1	28	61	72
Dysenteria chronica.....	78	1	7	10	11
Dyspepsia.....	10	82	226	314	386
Enteritis.....			2	12	12

## Aggregate of recorded cases of sickness occurring at United States Naval Academy—Continued.

Diseases.	At Annapolis, Md., Oct. 1845, to Apr. 1861, 15 years and 7 months.		At Newport, R. I., May 1861, to Sept. 1865, 4 years and 5 months.		At Annapolis, Md., Oct. 1865, to Dec. 1876, 11 years and 3 months.		Total at An- napolis, Md., 26 years and 10 months.		Whole number, 31 years and 3 months.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
<b>CLASS IV.—LOCAL DISEASES—Continued.</b>										
<i>Order VII.—Diseases of the digestive system—Continued.</i>										
Fistula in ano.....	160		1		6		6		7	
Gastritis.....			4		16		176		180	
Hæmatemesis.....			1		1				1	
Hemorrhoids.....	21		7		55		76		83	
Hepatitis acuta.....	9		1		2		11		12	
Hepatitis chronica.....	8				4	1	12	1	12	
Icterus.....	1		8		8		9		17	1
Peritonitis.....	2				5		7		7	
Pharyngitis.....	1				6		7		7	
Prolapsus ani.....					1		1		1	
Splenitis.....					1		1		1	
Stomatitis.....	2		2		3		5		7	
Tonsillitis.....	341		431		614		955		1,386	
Bilious disorder.....	8						8		8	
Disordered stomach.....	75						75		75	
Disordered bowels.....	3				3		3		3	
Nausea.....	2						2		2	
Gastro-enteritis.....	3						3		3	
Glossitis.....	1						1		1	
Ranula.....					1		1		1	
<i>Order VIII.—Diseases of the urinary and genital system.</i>										
Albuminuria.....										
Calculus.....	1				3		3		3	
Cystitis.....							1		1	
Diabetes.....					1		1		1	

<i>Dysuria.</i>	.....	1	1	1	2
<i>Leucuria.</i>	.....	1	1	1	2
<i>Nephritis.</i>	.....	4	5	1	1
<i>Ophthalmia.</i>	.....	31	31	42	45
<i>Phymosis.</i>	.....	1	1	1	1
<i>Enuresis.</i>	.....	1	1	2	3
<i>Rematuria.</i>	.....	3	3	3	3
<i>Hydrocele.</i>	.....	1	1	1	3
<i>Spermatorrhœa.</i>	.....	1	1	6	8
<i>Urethral stricture.</i>	.....	5	6	10	11
<i>Variocoele.</i>	.....	4	2	2	3
<i>Hydrocele of the cord.</i>	.....	1	1	1	1
<i>Balanitis.</i>	.....	1	1	1	1
<i>Order IX.—Diseases of the locomotive system.</i>					
<i>Ankylosis.</i>	.....	1	1	1	2
<i>Hydrops articuli.</i>	.....	1	2	1	2
<i>Necrosis.</i>	.....	1	1	1	2
<i>Periostitis.</i>	.....	1	1	1	1
<i>Synovitis.</i>	.....	1	7	8	8
<i>Muscular contractions.</i>	.....	3	1	3	3
<i>Order X.—Diseases of the integumentary system.</i>					
<i>Abcessus.</i>	.....	104	16	241	257
<i>Acne.</i>	.....	9	1	10	1
<i>Adentitis.</i>	.....	6	3	27	30
<i>Anthrax.</i>	.....	9	2	15	17
<i>Ecthyma.</i>	.....	.....	.....	1	1
<i>Eczema.</i>	.....	.....	25	4	29
<i>Erythema.</i>	.....	.....	.....	2	2
<i>Furunculus.</i>	.....	52	94	316	410
<i>Herpes.</i>	.....	2	3	22	25
<i>Lichen.</i>	.....	1	7	7	8
<i>Paronychia.</i>	.....	8	16	38	54
<i>Pemphigus.</i>	.....	.....	.....	6	6
<i>Pernio.</i>	.....	.....	1	7	8
<i>Onychia.</i>	.....	.....	4	4	4
<i>Prurigo.</i>	.....	3	3	3	6
<i>Psoriasis.</i>	.....	3	1	4	4
<i>Urticaria.</i>	.....	5	2	9	11
<i>Unguis involutus.</i>	.....	7	7	7	7
<i>Ulcus.</i>	.....	28	11	81	92
<i>Morbi cutis?</i>	.....	7	.....	7	7

## Aggregate of cases of sickness occurring at United States Naval Academy—Continued.

Diseases.	At Annapolis, Md., Oct., 1845, to Apr., 1861, 15 years and 7 months.		At Newport, R. I., May, 1861, to Sept., 1865, 4 years and 5 months.		At Annapolis, Md., Oct., 1865, to Dec., 1876, 11 years and 3 months.		Total at An- napolis, Md., 26 years and 10 months.		Whole number, 31 years and 3 months.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
CLASS V.—NON-MALIGNANT TUMORS AND CYSTS.										
Tumor.....	1				14		15		15	
CLASS VI.—VIOLENT DISEASES AND DEATHS. Order I.—Wounds, injuries, and accidents.										
Abrasio.....			3		61		61		64	
Ambustio.....	6		8		33	2	39	2	44	2
Concussio cerebri.....			1		9	3	9	3	10	3
Contusio.....	116		51		325		441		492	
Fractura.....	7		4	1	37		44		48	1
Hernia.....	6		1		20		26		27	
Luxatio.....	12		2		10		22		24	
Hernia humoralis.....	1									
Strumma.....	49				252		301		336	
Submersio.....	2		35		4	4	4	4	4	4
Venenatio.....			1							
Vulnus contusum.....	14		20		90		104		124	
Vulnus incisum.....	58		6		82		140		146	
Vulnus laceratum.....	27				23		50		50	
Vulnus punctum.....	12		2		53		45		47	
Vulnus sclopetarium.....	5				7		12		12	
Morbi varii.....	13						13		13	
Total.....	4,717	4	2,782	13	10,879	84	15,696	88	18,878	51

## NAVAL ACADEMY.

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*Abstract of deaths at United States Naval Academy, 1845 to 1876.*

	1876	1875	1874	1873	1872	1871	1870	1869	1868	1867	1866	1865	1864	1863	1862	1860.	1856	1854	1853
Students (12)														4			1	1	
Acting midshipmen (2)																			
Midshipmen (8).....																			
Chief-midshipman (2)																			
Chief engineer U. S. N. (1)																			
Officers (5)																			
Chiefs (2).....																			
Petty officers (8)																			
First-class fireman (1)																			
Seamen (7)																			
Ordinary seaman (1)																			
Landsman (6)																			
Coal-heaver (1)																			
Second-class boy (1)																			
Marines (6)																			
Musicians (3)																			
Total (51).	1	1	1	1	2	6	1	5	3	11	2	1	5	1	3	1	1	3	2

\* Four cases of typhus fever, believed to have been contracted on board U. S. S. Constitution, who died after removal on shore, at Newport, including "admiral-midshipman Cox, who was accidentally drowned while practicing in a shell boat.

*Deaths of students at U. S. Naval Academy, and of those attached to it, but away from it on leave of absence.*

I.—AT U. S. NAVAL ACADEMY, ANNAPOLIS, MD.

1. Acting Midshipman Alfred W. Brodhead, of Pennsylvania, January 23, 1853, of congestive fever.
2. Acting Midshipman Henry J. Weisman, of Pennsylvania, November 17, 1854, of meningitis.
3. Midshipman Frederick A. Belknap, of Maine, November 20, 1865, of typhoid fever.
4. Midshipman Charles H. Jenks, of Pennsylvania, February 26, 1866, of typhoid fever.
5. Midshipman Joel Hall, of Connecticut, June 23, 1866, of typhoid fever.
6. Cadet-Midshipman William H. Cox, of Tennessee, April 14, 1875, of drowning.
7. Cadet-Midshipman Mark Bridges, of North Carolina, July 9, 1876, of malignant remittent fever.

II.—AT U. S. NAVAL ACADEMY, NEWPORT, R. I.

1. Midshipman Foxhall P. Smith, of Virginia, January 19, 1863, of typhus fever.
2. Midshipman Richard A. Dana, of Maine, April 2, 1863, of typhus fever.
3. Midshipman William K. Butler, of Connecticut, April 4, 1863, of typhus fever.
4. Midshipman Frederick B. Griswold, of New York, April 9, 1863, of typhus fever.
5. Midshipman James H. Eaton, at large, April 28, 1865, of typhoid fever.

III.—AT U. S. NAVAL HOSPITAL, NEAR ANNAPOLIS, MD.

1. Cadet-Midshipman Carshena Wallace, of Washington Territory, December 13, 1874, of phthisis pulmonalis.

IV.—WHILE AWAY ON LEAVE OF ABSENCE.

1. Acting Midshipman B. F. Perry, of South Carolina, at Greenville, S. C., July 3, 1860, of phthisis pulmonalis.
2. Acting Midshipman Odillon B. Hobbs, of New Hampshire, at Ipswich, Mass., October 1, 1860, of phthisis pulmonalis.
3. Acting Midshipman Samuel Swift, of Pennsylvania, at Philadelphia, Pa., November 23, 1860, of phthisis pulmonalis.
4. Midshipman Anthony R. Truax, of Michigan, at Grand Rapids, Mich., February 18, 1865, of phthisis pulmonalis.
5. Cadet-Midshipman John P. Arnold, of Alabama, at Montgomery, Ala., July 13, 1876, of typhoid fever.

Total at the Academy at Annapolis and at Newport, 12; at Naval Hospital, Annapolis, 1; on leave of absence, 5. Total, 18.



*Detailed statement of ALL CASES of sickness at U. S. Naval Academy, Annapolis, Md., during the year 1876.*

Diseases.	Cases recorded on medical journals.		Cases not so recorded.		Aggregate admissions to sick and excused lists.	Number of days' study and exercise lost on account of sickness.
	Whole number, including officers and all others.	Officers, enlisted men, and others.	Cadets admitted to the sick-list.	Cadets admitted to the sick-list.		
CLASS I.—ZYMOTIC DISEASES.						
Order I.—Miasmatic diseases.						
Erysipelas .....	1	1				
Febris intermittens .....	63	36	27	42	47	246
Febris remittens .....	13	2	11		25	75
Order II.—Ethereal diseases.						
Syphilis primitiva .....	2	2				
Gonorrhoea .....	3	1	2		14	17
Order III.—Dietic diseases.						
Alcoholismus .....	4	4				
Delirium tremens .....	1	1				
CLASS II.—CONSTITUTIONAL DISEASES.						
Order I.—Diathetic diseases.						
Adynamia .....	14	9	5	4	3	21
Rheumatismus acutus .....	4	2	2		60	133
Rheumatismus chronicus .....	26	26		8	31	51
Order III.—Tubercular diseases.						
Tuberculosis .....	1	1				
CLASS IV.—LOCAL DISEASES.						
Order I.—Diseases of the nervous system.						
Cephalalgia .....	58	2	56	234	118	644
Dementia .....	1	1				
Epilepsia .....	1	1				
Neuralgia .....	26	11	15	14	14	119
Paralysis .....	1	1				
Pleurodynia .....	1	1				
Vertigo .....	2		2	6	1	19
Order II.—Diseases of the eye.						
Amaurosis .....	2		2			9
Asthenopia .....	1		1	2		7
Conjunctivitis .....	5	2	3	1	2	6
Hordeolum .....	3		3	1		4
Ophthalmia .....	1		1			1
Blepharitis .....				1		8
					1	3

*Detailed statement of ALL CASES of sickness, &c.—Continued.*

Diseases.	Cases recorded on medical journals.			Cases not so recorded.			Aggregate admissions to sick and excused lists.	Number of days' study and exercise lost on account of sickness.
	Whole number, including officers and all others.	Officers, enlisted men, and others.	Cadets admitted to the sick-list.	Cadets admitted to the sick-list.	Cadets admitted to the excused list.			
<i>Order III.—Diseases of the ear.</i>								
Otalgia.....	3	1	2	5	2	9	20	
Otitis.....	4	1	3	7	10	16	16	
<i>Order IV.—Diseases of the teeth.</i>								
Odontalgia.....	1		1	9	6	16	20	
<i>Order V.—Diseases of the circulatory system.</i>								
Palpitation.....	1		1		7	8	11	
<i>Order VI.—Diseases of the respiratory system.</i>								
Bronchitis acuta.....	2	2						
Catarrhus.....	296	97	199	17	337	553	883	
Epistaxis.....	1		1			1	3	
Hæmoptysis.....	1	1						
Pleuritis.....	1	1						
Pneumonia.....	3	*1	2		6	8	55	
<i>Order VII.—Diseases of the digestive system.</i>								
Cholera morbus.....	3	2	1			1	2	
Colica.....	31	10	21	21	41	83	164	
Constipation.....	2	2		8	8	16	19	
Diarrhœa acuta.....	129	25	104	57	88	249	377	
Dyspepsia.....	7	2	5	77	5	87	178	
Hæmorrhoids.....	3		3	2	18	23	28	
Hepatitis chronica.....	1	1						
Icterus.....	1		1			1	7	
Pharyngitis.....	4	1	3	12	13	28	66	
Tonsillitis.....	28	6	22	16	33	71	151	
Nausea.....				3	1	4	5	
<i>Order VIII.—Diseases of the urinary and genital system.</i>								
Orchitis.....	3	1	2		6	8	26	
Hæmaturia.....				1	5	6	13	
Hydrocele.....	1		1			1	1	
<i>Order IX.—Diseases of the locomotive system.</i>								
Synovitis.....	1	1						

\* Thomas Thompson, seaman-laborer, negro, died at Lockwoodville, of pneumonia.

*Detailed statement of ALL CASES of sickness, &c.—Continued.*

Diseases.	Cases recorded on medical journals.			Cases not so recorded.		Aggregate admissions to sick and excused lists.	Number of days' study and exercise lost on account of sickness.
	Whole number, including officers and all others.	Officers, enlisted men, and others.	Cadets admitted to the sick-list.	Cadets admitted to the sick-list.	Cadets admitted to the excused list.		
<i>Order X.—Diseases of the integumentary system.</i>							
Abcessus.....	12	6	6	1	7	14	86
Acne.....					2	2	2
Adenitis.....	2		2			2	6
Erythema.....				1		1	5
Furunculus.....	9	4	5	9	32	46	71
Herpes.....	1	1			6	6	6
Lichen.....				1	4	5	6
Onychia.....	3	1	2	2	17	21	71
Paronychia.....	1	1					
Pemphigus.....	1		1	1		2	3
Pernio.....	1	1					
Urticaria.....	1	1		1		1	3
Corns.....				2	15	17	23
<i>CLASS VI.—VIOLENT DISEASES AND DEATHS.</i>							
<i>Order I.—Wounds, injuries, and accidents.</i>							
Abrasio.....				7	37	44	60
Ambustio.....	4	4		1	6	7	9
Concussio cerebri.....	1		1		1	2	13
Contusio.....	13	5	8	12	93	113	170
Fractura.....	3		3		54	57	132
Hernia.....	3	2	1			1	7
Luxatio.....	1		1		1	2	6
Strenua.....	16	5	11	20	172	203	262
Submersio.....	1	*1					
Vulnus contusum.....	7	3	4		28	32	44
Vulnus incisum.....	1		1	2	29	32	33
Vulnus laceratum.....	2		2	2	11	15	22
Vulnus punctum.....	2	1	1		2	3	4
Total.....	847	296	551	603	1,415	2,569	4,334

\* John G. McKnight, sergeant of marines, accidentally drowned.

Average daily number of recorded cases for the entire year .....	9.45
Average daily number of admissions of cadets to sick and excused lists during academic year, September 20 to June 20 (274 days) .....	9.92
Average daily number of cadets on sick and excused lists during academic year, September 20 to June 20 (274 days) .....	15.94

Daily movement of diseases during fourth quarter 1876.

Day of month.	October.						November.						December.					
	Sick.			Cadets.			Sick.			Cadets.			Sick.			Cadets.		
	Officers.	Seamen.	Martines.	Total.	Excused.	Sick and ex- cused.	Officers.	Seamen.	Martines.	Total.	Excused.	Sick and ex- cused.	Officers.	Seamen.	Martines.	Total.	Excused.	Sick and ex- cused.
1	2	2	2	12	16	12	1	1	1	14	18	17	2	2	3	43	48	48
2	2	2	1	17	13	10	1	1	2	14	19	13	2	2	4	45	51	4
3	2	4	1	9	14	10	1	1	2	25	29	29	1	1	4	41	39	41
4	2	4	1	9	15	10	1	1	1	29	32	4	1	1	8	16	33	22
5	2	3	2	8	15	10	1	1	1	13	15	13	1	1	5	20	23	22
6	2	3	1	9	15	10	1	1	1	13	16	13	1	1	2	13	19	16
7	2	2	1	10	16	12	1	2	1	8	14	9	1	1	1	11	14	16
8	2	2	2	9	12	6	1	2	1	3	8	6	1	1	2	11	19	19
9	1	1	1	5	8	6	1	2	1	7	11	3	1	1	2	14	18	14
10	1	1	2	10	13	9	1	2	1	7	12	11	1	1	1	14	18	11
11	1	1	2	17	21	22	1	2	1	6	11	11	1	1	2	32	38	35
12	2	1	3	15	19	19	1	4	1	7	14	4	1	1	1	23	27	24
13	1	1	3	13	17	6	1	1	1	10	16	1	1	2	2	20	24	20
14	1	1	3	13	17	19	1	1	1	19	19	2	1	2	2	18	23	23
15	2	1	2	16	19	16	1	3	1	17	22	2	1	2	2	16	23	21
16	2	1	2	11	15	8	1	4	1	14	20	1	1	2	5	16	24	24
17	2	1	2	12	17	8	1	2	1	9	14	1	1	2	5	16	24	16
18	2	1	2	11	16	3	1	2	1	13	18	1	1	2	4	20	23	24
19	2	2	1	10	15	5	1	2	1	13	18	4	1	2	4	29	38	35
20	3	1	3	17	22	16	2	1	1	18	23	4	2	3	4	23	32	30
21	1	1	1	16	21	2	2	1	1	17	20	2	2	2	3	24	32	29
22	1	1	4	15	21	2	2	2	2	21	25	8	2	3	3	24	32	37
23	1	1	8	16	21	11	2	2	4	16	22	3	2	3	6	17	27	16
24	1	1	2	17	20	4	3	2	2	18	23	19	2	2	2	18	21	20
25	1	1	3	20	23	4	2	1	4	14	21	4	1	2	1	14	19	14
26	1	1	3	17	20	3	2	1	0	19	24	18	2	2	2	13	18	18
27	1	2	2	16	19	4	1	2	3	18	23	3	1	6	1	39	48	39
28	1	2	2	16	19	4	1	1	3	18	23	3	1	7	1	36	45	36
29	1	2	2	16	19	4	1	1	3	18	23	3	1	7	1	36	45	36
30	1	2	2	16	19	4	1	1	3	18	23	3	1	7	1	36	45	36
31	1	2	2	16	19	4	1	1	3	18	23	3	1	7	1	36	45	36

29	2	2	4	8	6	10	14	1	3	1	12	17	6	18	23	2	7	1	22	33	22	33						
30	2	4	12	6	15	19	1	2	3	10	16	4	14	20	4	2	8	6	18	9	18							
31	1	13	14	3	16	17	1	16	17	1	1	1	1	1	1	3	2	3	10	18	10	18						
Total	44	23	61	371	509	108	479	617	50	43	59	411	563	85	496	648	67	83	85	660	875	108	768	983				
Total for the quarter (92 days)																							1, 947		1, 743		2, 248	
Daily average																							21		18		24	

JANUARY 1, 1878.

The sanitary condition of this station was so fully reported by me a year ago that I have only to refer to what I then wrote for such information as I have been able to gather on the several points of hygiene, climatology, and medical topography.

The total sum of cases of sickness of sufficient importance to be recorded on the journal during the year ended 31st December, 1877, amounted to 1,022, against 847 during the previous twelve months. The minor complaints treated on the excused list or prescribed for at the dispensary, and of which no history is recorded, more than doubled this number. There was but one death during the year, that of Prof. R. S. Smith, from chronic disease of heart and kidneys. The special classification of recorded diseases is exhibited in the accompanying Table A.

TABLE A.  
*Classification of diseases.*

Class and order.	1876.	1877.
CLASS I.—Zymotic diseases	77	144
Order 1.—Miasmatic diseases	5	124
Order 2.—Erbethic diseases	5	10
Order 3.—Dietic diseases	5	10
CLASS II.—Constitutional diseases	44	39
Order 1.—Diathetic diseases	0	39
Order 2.—Developmental diseases	0	0
Order 3.—Tubercular diseases	1	0
CLASS III.—Parasitic diseases	0	0
CLASS IV.—Local diseases	661	710
Order 1.—Diseases of the nervous system	90	215
Order 2.—Diseases of the eyes	12	17
Order 3.—Diseases of the ears	7	4
Order 4.—Diseases of the teeth	1	7
Order 5.—Diseases of the circulatory system	1	8
Order 6.—Diseases of the respiratory system	304	149
Order 7.—Diseases of the digestive system	209	247
Order 8.—Diseases of the genito-urinary system	5	4
Order 9.—Diseases of the locomotive system	1	9
Order 10.—Diseases of the integumentary system	31	50
CLASS V.—Non-malignant tumors	0	1
CLASS VI.—Violent diseases and deaths	54	128
Order 1.—Wounds, injuries, accidents.	54	128
Total	847	1,022

Local climatic influences have been more notable than in previous years, the number of well-developed attacks of intermittent fever having increased from 76 to 95; and of headache and neuralgia, attributable to the same causes, from 84 to 209;

while there was a more general complaint of malaise, anorexia, headache, neuralgic pains, etc., due to malaria, and requiring a large amount of prophylactic medication. Of 1,046 prescriptions compounded at the dispensary during the three months of the last quarter of the year alone, for officers, employés, their families, and others not represented on the reports, the vast majority were antiperiodic remedies. While miasmatic influences can never be expected to be wholly overcome in this locality, they can, probably, be yet further mitigated by a more thorough system of drainage of the grounds in and about the several government establishments.

Measles and scarlet fever were epidemic in Annapolis in the early part of the year, but by a rigid quarantine were almost excluded from the institution. In spite of every precaution two cases of scarlet fever appeared among the children of officers, and ten cases of measles among cadets, who were immediately removed to the United States Naval Hospital, near Annapolis, which was re-opened for the purpose. But for the possibility of thus isolating these cases, this disease would probably have spread as rapidly among the cadets and children within the walls, as it did among the adults and children outside, to the probable complete interruption of the business of the school. While the Naval Hospital may be a larger building than might be necessary in a new construction, its admirable location and excellent appointments are advantages of the highest order to this institution whenever a similar seclusion of communicable diseases may be necessary. During the past eight years individual cases of scarlet fever, measles, mumps, varicella, varioloid, variola, and erysipelas have been transferred to it, and the academy has consequently been protected from epidemic visitations not uncommon in schools where so many youths are congregated.

The maximum number of cadets at the academy during the year was 376, an excess of 28 over the previous year, compelling

even greater overcrowding than has heretofore been necessary. So large a portion of the day, however, is passed in other apartments, in going to and from recitation halls, and in outdoor formations, drills, exercises, and sports, that the restricted air-space is less a subject of sanitary criticism, except when the rooms are overheated or ill-ventilated; but while no influence upon the health may be directly traceable to overcrowding, it is manifestly prejudicial to discipline and habits of study. The insubordinate, indifferent, or idle student can not only prevent his zealous and industrious room-mates from attention to their work, but initiate them in practices obnoxious to health. There is, consequently, no more urgent need for this academy than enlarged accommodations for its pupils.

Errors in diet, especially the eating of improper food late at night, reading or study by dim lights, and in cold rooms after hours, surreptitious smoking, sleeping beside open windows, carelessness and impropriety in dress, particularly in wearing undergarments unsuited to the season and not wearing overcoats, lying on wet or damp ground, and neglect to remove wet clothing, are the chief factors of the ordinary derangements of health which appear on the sick-lists, and which are common to youths elsewhere. While the pupils here are necessarily deprived of parental control, they are, probably, under better restraint than in their own homes, and are subjected to as vigilant surveillance as the police arrangements will permit.

That the judicious arrangement of open-air exercises and drills, the encouragement given to athletic sports, and the admirable dietary, together with the general order and regularity of life at the academy, are in the highest degree advantageous, is illustrated by the rapid gain in weight of the newly-admitted cadets. The following Table B, of candidates who were rejected at their first examination for admission to the academy and were successfully re-examined a year later, exhibits, first, their weight at both these examinations, showing their



rate of growth during a year of home life; and second, their weight after having been a similar period at the academy, showing the more rapid gain under the conditions by which they are here surrounded. It will be observed that the gain in weight bears no relation to increase in height, this, indeed, having often ceased or been greatly retarded; the former may, therefore, properly be regarded as the exponent of the improved nutrition of the general system.

TABLE B.

*Rates of growth of cadets before and after entering academy.*

Time of examination.		Age when exam- ined.	Height.	Weight.	Increase in weight per month.	Increase in height per month.
		<i>Yrs. mos.</i>	<i>Inches.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Inches.</i>
C.	First examination for admission.....	15 4	63	110		
	Second examination for admission.....	16 4	65	120½	.80	.16
	Seventeen months after admission.....	17 9	66½	146	1.48	.08
B.	First examination for admission.....	16 6	64½	119½		
	Second examination for admission.....	17 3	65½	123	.41	.05
	Twenty months after admission.....	18 11	66½	150	1.35	.05
L.	First examination for admission.....	16 8	68½	130		
	Second examination for admission.....	17 8	68½	139	.75	.01
	Fourteen months after admission.....	18 10	69½	174	2.50	.06
R.	First examination for admission.....	16 9	65½	103½		
	Second examination for admission.....	17 9	66½	109	.45	.05
	Fifteen months after admission.....	19 0	66½	125	1.07	.02
W.	First examination for admission.....	17 3	64½	103		
	Second examination for admission.....	18 3	65½	108	.41	.09
	Seventeen months after admission.....	19 8	67	128½	1.21	.08
M.	First examination for admission.....	17 10	65	113		
	Second examination for admission.....	18 10	65½	116½	.29	.04
	Seventeen months after admission.....	20 3	66½	134	1.03	.05
M <sup>2</sup> .	First examination for admission.....	18 1	69	140		
	Second examination for admission.....	19 1	69½	141½	.14	.03
	Fifteen months after admission.....	20 4	69½	169	1.81	.00
A.	First examination for admission.....	21 1	67½	131½		
	Second examination for admission.....	22 1	67½	133½	.14	.00
	Sixteen months after admission.....	23 5	67½	156	1.41	.03

Statistics now in process of tabulation show that the cessation of the regular habits of living at the academy likewise results in a certain loss of weight. The Table C represents the rate of growth of a number of the graduates from the academy, examined at various periods of their pupilage, and again when they returned to the academy for examination for promotion after a year or more of service in the Navy, subsequent to graduation.

TABLE C.

*Table showing loss of weight of cadets after leaving academy.*

Time of examination.		Age when examined.	Height.	Weight.	Gain in weight at academy.	Loss of weight after leaving academy.
		<i>Yrs. mos.</i>	<i>Inches.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>
M.	When admitted to academy .....	14 9	64½	109	.....	.....
	While at the academy .....	16 7	68	132½	.....	.....
	Seventeen months after leaving academy.	18 7	69	138	29	.....
	.....	20 0	69	135	.....	3
C.	When admitted to academy .....	14 10	60	74	.....	.....
	While at the academy .....	15 8	62	85	.....	.....
	Seventeen months after leaving academy.	17 6	66½	109½	42½	.....
	.....	19 6	67½	116½	.....	5½
B.	When admitted to the academy .....	15 9	60	80	.....	.....
	While at the academy .....	17 9	63½	105	.....	.....
	Seventeen months after leaving academy.	19 9	65½	120	40	.....
	.....	21 2	66	117	.....	3
H.	When admitted to the academy .....	15 11	64½	112	.....	.....
	While at the academy .....	17 9	64½	121	.....	.....
	Seventeen months after leaving academy.	19 9	65½	130½	18½	.....
	.....	21 2	65½	126	.....	4½
C <sup>2</sup> .	When admitted to the academy .....	16 0	62½	100	.....	.....
	While at the academy .....	17 10	66½	122	.....	.....
	Eighteen months after leaving academy.	19 10	67½	136	36	.....
	.....	21 4	67½	133	.....	3
M <sup>2</sup> .	When admitted to the academy .....	16 0	62	101	.....	.....
	While at the academy .....	17 11	65½	119½	.....	.....
	Seventeen months after leaving academy.	19 11	66½	133½	32½	.....
	.....	21 4	66½	129	.....	4½

*Table showing loss of weight of cadets after leaving academy—Continued.*

Time of examination.		Age when examined.	Height.	Weight.	Gain in weight at academy.	Loss of weight after leaving academy.
		<i>Yrs. mos.</i>	<i>Inches.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>
N.	When admitted to the academy.....	16 3	62½	110	.....	.....
	While at the academy.....	17 11	63	128	.....	.....
	.....	19 11	63	135½	25½	.....
	Twenty months after leaving academy..	21 7	63½	129	.....	6½
F.	When admitted to the academy.....	16 9	66½	100	.....	.....
	While at the academy.....	18 5	67	120	.....	.....
	.....	20 5	67½	124½	24½	.....
	Sixteen months after leaving academy...	21 9	68	121	.....	3½
G.	When admitted to the academy.....	17 5	62½	105	.....	.....
	While at the academy.....	19 4	63	112½	.....	.....
	.....	21 4	63½	120	15	.....
	Seventeen months after leaving academy.	22 9	63½	117	.....	8

The last weight in each case is that of this final examination, and in every instance, it will be observed, there has been loss of weight, although in several there has been continued growth in height. It is expected that after a few years the carefully recorded physical history of cadets now kept will furnish more exact information on these points, the intention being to register the progress of physical development of the cadet from the date of his first examination for admission, if possible, to the completion of his adult development, or at least for a period of from seven to nine years. Table D represents the form which has been prepared for this purpose.



## METEOROLOGY.

The meteorological record for the year 1877 (Table E), exhibits an annual temperature, above the mean of previous years, the increase being distributed over the summer and autumn months. The averages for the several seasons, as compared with the mean of observations extending over a period of thirty years, from 1846 to 1876, were:

Seasons.	1846-1876.	1877.
	°	°
Spring .....	53. 10	53. 22
Summer .....	76. 70	78. 17
Autumn .....	57. 06	60. 52
Winter .....	36. 20	36. 72
Annual mean .....	55. 76	57. 15

The total rainfall during 1877 was 44.65 inches, being above that for 1876, which was 40.97 inches, but below the average for former years, which was 45.20 inches.

TABLE E.

Meteorological record, Cadet Hospital, United States Naval Academy, Annapolis, Md.

Date.	Thermometer.				Hygrometer.						Proportion of sky clear.		Days.											
	7.35 a. m.	3 p. m.	9 p. m.	Daily mean.	Maximum.	Minimum.	7.35 a. m.	3 p. m.	9 p. m.	Daily mean.	Lowest relative humidity.	Number days of relative humidity between—						Cloudless or cirrus.	Rainy or overcast.	Rain fall.				
												40-50.	50-60.	60-70.	70-80.	80-90.	90-100.							
1877.																								
January	25.58	35.80	23.26	30.54	57	3	78.87	72.32	78.90	76.69	50	...	1	5	16	9	...	3.8	3.8	2.0	0	12	3.70	
February	33.18	46.18	38.07	39.14	66	21	81.03	61.35	74.39	72.25	35	...	4	7	11	6	...	6.5	6.0	2.5	0	7	1.79	
March	37.77	47.03	40.71	41.83	74	17	76.35	89.37	73.40	79.70	32	...	2	8	11	5	...	5.5	5.0	1.8	1	10	4.24	
April	49.60	59.98	52.47	54.00	76	34	78.51	66.11	79.10	74.57	36	1	5	6	7	7	4	5.5	5.4	1.9	3	11	4.63	
May	59.29	70.94	61.29	63.84	92	43	78.13	61.68	77.65	72.48	47	...	1	8	20	1	...	8.0	7.4	3.3	3	3	1.78	
June	72.46	82.72	73.76	76.31	93	64	73.90	58.37	75.43	69.22	42	...	2	13	14	2	...	6.7	6.6	2.6	0	6	5.64	
July	76.36	86.48	77.78	80.20	93	69	60.52	75.55	76.74	70.95	38	...	5	12	11	3	...	7.0	6.7	0	0	5	2.88	
August	73.60	84.14	76.57	78.00	94	66	76.03	59.50	72.80	69.65	39	...	1	4	8	10	7	4.5	4.7	4.0	0	10	2.21	
September	66.37	75.23	68.23	69.94	87	54	76.40	63.50	76.70	72.20	37	1	4	8	10	7	5.0	6.0	3.0	0	8	4.27		
October	60.12	67.80	57.12	61.61	80	44	76.71	61.55	76.65	71.63	36	1	3	8	14	5	6.7	6.6	2.0	0	4	6.67		
November	47.03	54.00	49.03	52.02	67	27	72.83	63.25	70.95	69.01	39	4	4	8	6	7	1	6.4	6.6	2.5	0	7	4.86	
December	36.16	44.74	40.87	40.59	64	25	68.03	57.77	65.61	63.40	34	5	0	7	7	2	1	6.2	6.5	2.6	0	6	1.98	
Annual mean	53.12	62.91	55.49	57.17	94	3	74.73	65.86	74.86	71.82	30	12	41	104	141	55	12	Total rainfall 1877.						44.65

JANUARY 1, 1879.

The sanitary condition of this station, during the past twelve months, has not been noticeably different from that of the previous year. The principal ailments have been such as are due to malarial climatic influences, to wit, headaches, neuralgias, catarrhal and digestive derangements. The accompanying table (A) exhibits the nosological classification of cases occurring among officers, enlisted men, cadets, and others officially connected with the academy, and therefore entered upon the medical journals. None of these terminated fatally. As I have stated in former reports, this table inadequately exhibits the actual amount of sickness on the station, since no record is kept of the cases of women, children, and non-enlisted employes, treated by the medical officers, but some indication of the number of these extraneous patients may be derived from the fact that they required the issue of nearly five thousand prescriptions.

TABLE A.—Admissions to sick-list during the year 1878.

ZYMOTIC DISEASES.		LOCAL DISEASES.	
<i>Miasmatic diseases.</i>		<i>Diseases of the nervous system.</i>	
	No.		No.
Catarrhus epidemicus .....	67	Cephalalgia .....	157
Febris continua simplex .....	1	Insolatio .....	3
Febris intermittens .....	70	Neuralgia .....	9
Febris remittens .....	5	Nostalgia .....	8
Varicella .....	1	Pleurodynia .....	1
		Sciatica .....	1
<i>Enthetic diseases.</i>		<i>Diseases of the eye.</i>	
Gonorrhœa .....	9	Asthenopia .....	6
Syphilis primitiva .....	1	Blepharitis .....	2
		Conjunctivitis .....	3
<i>Dietic diseases.</i>		Hordeolum .....	5
Alcoholismus .....	5	Iritis .....	2
		Keratitis .....	1
CONSTITUTIONAL DISEASES.		Leucoma .....	1
<i>Diathetic diseases.</i>		Ophthalmia .....	2
Adynamia .....	2	<i>Diseases of the ear.</i>	
Lumbago .....	3	Otalgia .....	4
Myalgia .....	9	Otitis .....	1
Rheumatismus subacutus .....	3	<i>Diseases of the teeth.</i>	
Rheumatismus acutus .....	7	Odontalgia .....	21
Rheumatismus chronicus .....	7	<i>Diseases of the circulatory system.</i>	
Torticollis .....	7	Lymphangitis .....	3
PARASITIC DISEASES.		Syncope .....	1
Scabies .....	2	Varix .....	1
		Vertigo .....	3

<i>Diseases of the respiratory system.</i>		<i>Diseases of the integumentary system.</i>	
	No.		No.
Bronchitis acuta .....	1	Abscessus .....	14
Bronchitis chronica .....	5	Adenitis .....	6
Catarrhus bronchiorum .....	43	Cellulitis .....	1
Catarrhus narium .....	3	Eczema .....	2
Epistaxis .....	3	Furunculus .....	10
Hæmoptysis .....	2	Herpes .....	1
Laryngitis .....	2	Herpes zoster .....	1
Phthisis pneumonica chronica .....	1	Paronychia .....	5
Pneumonia .....	2	Porriço .....	1
		Purpura .....	1
		Unguis involutis .....	1
		Ulcus .....	3
		Verruca .....	1
<i>Diseases of the digestive system.</i>		VIOLENT DISEASES.	
Cholera morbus .....	10		
Colica .....	29		
Constipatio .....	28		
Diarrhœa acuta .....	76		
Dysenteria acuta .....	9		
Dyspepsia .....	1		
Hæmorrhœis .....	4		
Icterus .....	1		
Nausea .....	2		
Pharyngitis .....	114		
Tonsillitis .....	26		
<i>Diseases of the urinary and genital system.</i>		<i>Wounds, injuries, and accidents.</i>	
Balanitis .....	1	Abrasio .....	5
Orchitis .....	3	Ambustio .....	4
Urethra strictura .....	3	Concussio cerebri .....	1
Varicocele .....	1	Contusio .....	44
		Explosio .....	1
		Fractura .....	3
		Hernia .....	1
		Stremma .....	54
		Vulnus contusum .....	13
		Vulnus incisum .....	4
		Vulnus laceratum .....	10
		Vulnus punctum .....	4
		Vulnus sclopetarium .....	2
<i>Diseases of the locomotive system.</i>		Total admissions, 1878 .....	1,002
Arthritis .....	1		
Necrosis .....	1		
Synovitis .....	3		

During the first quarter of the year, there was the usual prevalence of epidemic catarrh, and, during the last two months, hooping-cough has been common in Annapolis. A few cases occurred among children in officers' families residing within the academy limits, but the enforcement of quarantine restrictions has prevented its appearance among the cadets. There have been no deaths during the year.

The following, Table B, exhibits a summary of all the recorded cases of disease which have been treated at this academy since its organization in 1845. The numbers within the brackets are the deaths under each class:

TABLE B.

Zymotic diseases .....	2,877 (15)
Miasmatic diseases .....	2,617 (15)
Euthetic diseases .....	185
Dietic diseases .....	75



Constitutional diseases .....	891	(2)
Diathetic diseases .....	888	
Tubercular diseases.....	3	
Parasitic diseases.....	67	
Local diseases.....	14,832	(24)
Diseases of the nervous system .....	2,673	(3)
Diseases of the eyes .....	642	
Diseases of the ears.....	146	
Diseases of the nose .....	9	
Diseases of the teeth.....	124	
Diseases of the circulatory system.....	63	
Diseases of the respiratory system.....	3,892	(18)
Diseases of the digestive system .....	6,063	(3)
Diseases of the genito-urinary system .....	103	
Diseases of the locomotive system.....	32	
Diseases of the integumentary system .....	1,085	
Non-malignant tumors .....	16	
Wounds, injuries, and accidents .....	1,719	(11)
Total.....	20,402	(52)

Table C represents the relative percentage of sickness among cadets and others officially attached to the station, during the year ended, and likewise for the year 1877, when I commenced the practice of keeping separate records of cadets and of officers, seamen, and marines. Living under the regular conditions of life here enforced, and subjected to a minimum of morbid influences, there is, nevertheless, five times as much recorded sickness among cadets as among all others on the station. The coincidence of the percentages of the two years confirms the belief that much of the recorded sickness among cadets is due to complaints, either deliberately feigned or of such trifling character that they have been magnified and reported only as a means of evading recitations, examinations, or exercises. It would be desirable, hereafter, where an actual unusual susceptibility to disease is shown, by the over-frequent disablement of a cadet for the simple duties required of him at the Naval Academy, that it shall be taken into consideration at his final examination, as an evidence of his unfitness for those more arduous duties of a naval officer which will be exacted of him after graduation. With this in view, I have had prepared a health record

of each individual cadet, exhibiting collectively every occasion of his appearance upon the sick and excused lists, by which means the board of medical examiners will be better enabled to judge of his physical qualifications for the naval service.

TABLE C.

1877.

Classes of persons furnishing sick cases.	Well.	Admissions to the sick-list.	Percentage of sick cases to whole number of individuals.
Total officers, men, and cadets on the station .....	925	984	106
Others than cadets .....	565	245	43
Cadets only .....	360	739	205
Cadet-midshipmen .....	271	597	220
Cadet-engineers .....	89	142	159

1878.

Total number officers, men, and cadets .....	925	1,002	108
Others than cadets .....	556	239	43
Cadets only .....	369	763	207
Cadet-midshipmen .....	268	631	235
Cadet-engineers .....	101	132	130

A careful analysis of the sick-list shows that the recorded sickness at the academy is unequally distributed between the cadet-midshipmen and the cadet-engineers. While the percentage of cadet-engineers in the school has risen since 1877 from 20.5 to 27.3, the percentage which they bear upon the sick-list has, during the same period, fallen from 22 to 15, as shown below:

Period of time.	Percentage of individuals.		Percentage of sick reported.	
	Cadet-midshipmen.	Cadet-engineers.	Cadet-midshipmen.	Cadet-engineers.
During first half of 1877 .....	79.5	20.5	82	18
During second half of 1877 .....	75.3	24.7	78	22
During first half of 1878 .....	75.3	24.7	81	19
During second half of 1878 .....	72.7	27.3	85	15

The explanation of this fact is undoubtedly to be found partly in the younger age of many of the cadet-midshipmen, but chiefly in the different system of examination by which they are admitted, only twenty-five cadet-engineers being annually selected by competition from among a large number of candidates, these during the past year amounting to one hundred and fifty. The successful applicants are, therefore, not only better prepared, but presumably of more studious habits, and less disposed to seek refuge in the sick-list from neglected or difficult recitations and examinations. A similar system of competitive examination for the appointment of cadet-midshipmen would, therefore, probably result in a marked diminution in the nominal sickness of the academy, with a corresponding improvement in its discipline and drill, as well as studies.

During the course of the annual physical examinations of the cadets, at the beginning of the current academic year, my attention was attracted by the loss of weight and strength exhibited by so many, in marked contrast to the rapid progressive growth and development which are characteristic of the pupils of this school, and are due to the regularity of its regimen. I found, on further inquiry, that the particular individuals who had suffered this loss were members of the new second class, who had been three or four months at home on leave of absence, during which time they were released from the restraining influences to which they are here subjected. In others, in whom there was no actual decrease below the weight of the previous year, the rate of development prior to that year was greatly retarded. These several facts are illustrated in the Table C.

TABLE C.—*Exhibiting (1) rate of growth prior to admission into Naval Academy. (2) Increased development after fourth-class year and third-class cruise. (3) Loss after long second-class leave of absence.*

Cadets of second class.	Weight when first examined for admission.	Weight when examined one year later.	Weight after first practice cruise.	Weight after long leave of absence.	Rate of growth prior to admission.	Gain after first year at Naval Academy.	Loss after four months leave of absence.
	Failed to enter.	Fourth class.	Third class.	Second class.			
	1875.	1876.	1877.	1878.			
A.....	105	103	123	116	-2	+20	-7
B.....	130	139	174	171	+9	+35	-3
C.....	103	108	128	122	+5	+20	-6

*Exhibiting actual loss of weight after long second-class leave of absence.*

	1876.	1877.	1878.		
D.....	158	183	175	+25	-8
E.....	126	145	140	+19	-5
F.....	124	151	144	+27	-7
G.....	105	137	133	+32	-4
H.....	116	138	133	+22	-5
I.....	112	141	140	+29	-1
J.....	127	149	148	+22	-1
K.....	107	125	124	+22	-1

*Exhibiting retardation of growth after long second-class leave of absence.*

	1876.	1877.	1878.		
L.....	136	150	151	+14	+1
M.....	109	127	130	+18	+3
N.....	114	124	127	+10	+3
O.....	120	151	154	+31	+3
P.....	136	164	166	+28	+2
Q.....	82	112	117	+30	+5

The average annual increase in weight of 98 cadets of the third class, who had made the practice cruise of 1878, was  $12\frac{1}{2}$  pounds; that of 95 cadets of the second class, after the practice cruise of 1877, was 18 pounds, and this was wholly checked by the long leave of absence of this class in the summer following. The conclusion is, therefore, inevitable that the practice of granting a long leave of absence at the close of the second academic year is extremely prejudicial; indeed, the effect of the shorter leave of one month, which was given to

the third class prior to their cruise, on account of the non-arrival of the *Constellation* from Europe, is manifest in the reduction of the annual rate of gain from 18 pounds in 1877 to 12½ pounds in 1878. In former reports I have shown from instances of graduates returning to the academy for re-examination after two years' absence, that their physical condition was markedly worse than at the date of their graduation. In consideration of these facts I suggested to the superintendent, as a sanitary measure of the utmost importance, that no leave of absence for a longer period than three weeks be granted to any of the classes, all these being required to make a summer cruise; and the superintendent advises that such leaves shall follow the cruise rather than precede.

A progressive deterioration of sight, probably due, as at other schools, to defective methods of illumination, and here, also, to clandestine study after hours by a feeble light, was remarked, at the annual physical examination, in the cases of many cadets, especially those whose vision had been already impaired when admitted.

All the sickness at the academy is not, however, chargeable to climatic influences and personal indiscretions. Defective drainage and sewerage, insufficient quarters, and faulty ventilation contribute their share as causes of impaired health. The large number of cadets has, as in the previous year, necessitated overcrowding, to obviate the effects of which, as well as to secure a more equable temperature, I recommended the removal of all transom-sashes from above the doors, and the insertion of a board, six inches wide, under the bottom edge of the lower sash of each window, permitting the inflow of an upward current of fresh air, where the lower sash overlaps the upper. The superintendent immediately directed this to be done, and he has deferred action until the close of the session upon my suggestion to substitute latticed panels for the solid doors of cadets'

rooms. One considerable source of catarrhal troubles arises from the overheating of rooms and their rapid cooling by throwing the windows wide open. This will be remedied by equalizing the temperature of the rooms with that of the corridors, by preventing excessive and irregular cooling, and by protecting the more exposed portions of the building from prevailing cold winds.

Though care was taken early in the term to completely flush out all the sewers, the regurgitation of sewer-gas, when the outlets of the mains are exposed to strong winds at low tide, can probably only be prevented by outdoor vents, indoor traps of whatever kind being insufficient for this purpose.

The opinions of the medical officers of this institution as to the sanitary necessity for the interdiction of the use of tobacco by cadets have received the following strong indorsements from three successive Boards of Visitors to the Naval Academy:

1. The report of the Board of Visitors, of which Commodore J. W. A. Nicholson, U. S. N., was president, dated June 20, 1877, states: "We highly commend the suggestions made by the Superintendent in his report to the Navy Department, and those contained in the late very complete sanitary report of Medical Inspector A. L. Gihon."

2. The report of the Board of Visitors, of which Rear Admiral John L. Worden, U. S. N., was president, dated June 20, 1878, states: "The regulation of the Naval Academy prohibiting the use of tobacco, as a sanitary measure, is a wise provision, and to use the language of Medical Inspector Gihon, in his well-digested report on this subject, the Board are of opinion 'that the regulations against the use of tobacco in any form cannot be too stringent; and, further, that while smoking should be wholly interdicted, special care should be exercised to prevent the substitution of chewing.'"

3. These reports were made while the regulations prohibiting

the use of tobacco were enforced. The report of the Board of Visitors, of which Commodore Thomas H. Stevens, U. S. N., was president, dated June 10, 1879, subsequent to the permission given to the cadets of all classes and all ages to smoke cigars, cigarettes, and pipes, states in terms no less emphatic: "The Board, being informed that the regulation of the Naval Academy prohibiting the use of tobacco, as a wise sanitary provision, is not now enforced, would most respectfully recommend that its strict enforcement be at once restored, as in their judgment the regulations against its use in any form cannot be too stringent."

When the prohibition of smoking was established at the Academy the measure met with earnest commendation by eminent sanitarians and others concerned in the education of youth. Capt. Stephen B. Luce, U. S. N., commanding the U. S. training-ship *Minnesota*, was one of its most enthusiastic advocates, and referred to his own success in preventing the apprentice boys of the Navy from using tobacco in any form. I am more than ever convinced, after my long experience at the Naval Academy, that the rigorous enforcement of the regulation prohibiting the use of tobacco by cadets will have a greater influence on the future physical history of these lads than almost any other measure of their academic regimen. The annual physical examinations at the close of the term of 1878-'79, during which smoking was permitted, revealed a large number of "tobacco hearts." While many, perhaps most, of the cadets have learned to smoke before admission, there is no doubt that its compulsory inhibition during their academic career will be of incalculable benefit to these, as well as to others who now acquire the habit here through the example of their classmates or room-mates.





## MEDICAL TOPOGRAPHY AND SANITARY CONDITION OF THE UNITED STATES NAVAL HOSPITAL, CHELSEA, MASS.

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REPORT OF MEDICAL DIRECTOR JOSEPH WILSON, U. S. NAVY.

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The Naval Hospital at Chelsea is situated on one of the arms of Massachusetts Bay, two miles north of the State-house.

This is a region of granite—granite hills, granite boulders, granite headlands. Glacial action has split and ground, grooved and polished, transported and heaped up; so that, in addition to the granite hills, there are many hills composed of transported material. These hills are pretty high, even two or three hundred feet. They are all rounded on top, with steep sides. Some are of stiff clay with a mixture of gravel and boulders—hard-pan; some are of clear gravel and sand. The islands of Boston Harbor are composed of this transported material; and likewise most of the conspicuous hills—Beacon Hill, Snow Hill, Fort Hill, Bunker Hill, Breed's Hill, Hospital Hill, Powderhorn Hill, Mount Bellingham, Mount Washington.

The ice and water are still bringing material, mud and gravel, from the hills; and this deposited by the tides, builds up many broad, marshy meadows. The marshes produce salt-water sedges, and when not interfered with by too much mud from the river, large bodies of peat are forming from the accumulated remains of such vegetation. The land occupied by the city of Boston is reclaimed from such hills and such marshes. Perhaps two-thirds of the land now occupied by buildings was originally a sedgy marsh.

The city of Boston seems to have no plan, not even the cow-paths of the Knickerbockers. It was built, is now building, on

the independence plan; each one designing a house for himself, locates it pleasantly on top of a hill, with elegant prospects, the sedgy marshes lending distance and enchantment to the view. A number of houses thus enjoying fine prospects, need a road, which is accordingly made, winding around the side of the hill. More persons build houses and roads till the hills are densely occupied, and then the increasing population takes to the marshes.

But the marshes cannot be occupied until they are filled up somewhat. Nature had provided sufficient material in the hills; but the taste for fine prospects and landscape gardening cuts off this resource. The prospects have vanished with the crowding, but the hills are covered with valuable houses. So the marshes are slowly and insufficiently filled with ashes and rubbish. Clay and gravel are too expensive. Railroad companies transport material long distances occasionally to fill up some parts of the marsh. The Puritan road-makers, in their search for the less slimy parts of the marsh, have made some curiously crooked streets.

The sanitarians of Massachusetts have traced the high death-rate of some of the cities to pulmonary consumption, typhoid fever, diphtheria, and cholera infantum; and they have traced these destructive diseases to dampness—mainly dampness of the soil, due to insufficient drainage of flat portions of the cities. The proximate cause of the high death-rate—25 to 30 per thousand—is excessive crowding, in about half enough houses, on insufficiently drained land; the remote cause is the taste for fine prospects and landscape gardening.

The suburbs of Boston, for elegant residences, fine prospects, and well-kept grounds, are not equalled elsewhere on the face of the earth.

After this description of trouble, we may be expected to suggest something in the way of remedy. "Oh! if this could only have been anticipated, how easy it would have been to save

these two millions of dollars (for the extension of Washington street).” Perhaps it would be well just now to commence anticipating, or rather to commence recognizing the fact, that Boston is extending over adjoining territory. Massachusetts has a State board of health with one civil engineer on it; let us have a State board of surveys with one physician on it. One of the first duties of this new board will be to lay out a few straight parallel streets, due east and west, from Boston Harbor to the Connecticut River. These streets to be useful must be regarded as master streets, controlling the direction of streets and the style of improvements everywhere. The master streets, with their corner stones and their grades, all indicated on proper maps, with the understanding that these streets and adjoining parallel streets are to be opened as needed, and the interfering streets and country roads are to be vacated as fast as city improvements reach them, will enable the landscape gardeners to enjoy the fine prospects without much injury to the health of the rising generation. The harbor commissioners, the board of health, and the commission on sewerage are doing their best for the city of Boston, and will probably save it, Holland fashion, by big dikes and big pumps.

The Naval Hospital is on the left or north bank of the Mystic River. The land, 115 acres, besides river flats, was purchased by commissioners of naval hospitals in 1825. It consists of a rounded hill 110 feet high, with steep sides, and a few acres on the northwest of salt-marsh. The hospital building, fronting the river, is on the south slope of the hill. Thus there is a good supply of sunshine, with westerly breezes from the river, and an efficient protection from northeast storms. The marsh seems to do us no harm; the summers are so short and so cool that there is no indication of malarial disease in this latitude.

The main building is a parallelogram, 148 feet by 70, with a pyramidal roof. It consists of three floors, besides the cellar

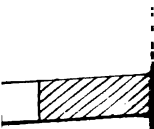
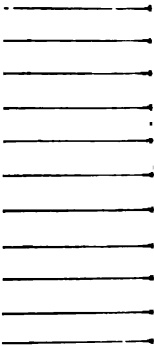
and the attic. The first or ground floor contains the entrance-hall, the dining-room, and the offices. The second and third floors contain the wards most in use. The general arrangement may be conveniently learned from the accompanying plan. There is on each floor a corridor running nearly the whole length of the building, giving access to the rooms on each side, and connecting with the entrance-hall by a stairway.

The wards of the west end are numbered 1, 2, 3, and 4 on each floor. The rooms at the other end (old building) are differently numbered, and are arranged for the accommodation of officers. On the plan, C indicates chimneys; V, ventilation-flues; 32, bath-rooms; 33, water-closets. The following table gives the dimensions and capacity of the several apartments:

Hospital of 100 beds.			Length, breadth, and height.	Area, square feet.	Capacity, cubic feet.	Number of occu- pants.	Area per man.	Cubic feet per man.
Entrance hall .....	57½	23½	10	1,351	13,512	100		
Corridor .....	88	10	10	880	8,800	100		
Two corridors, each .....	88	10	14	880	12,320	44	20	280
Dining-room .....	66	21½	14	1,419	14,190	100	114	142
Two wards No. 1, each .....	26½	23½	14	623	8,719	8	78	1,090
Two wards No. 2, each .....	26½	21½	14	570	7,876	8	71	985
Two wards No. 3, each .....	66	21½	14	1,419	19,782	20	71	880
Two wards No. 4, each .....	26½	21½	14	570	7,876	8	71	985
Six nurses' rooms, each .....	12	11	14	132	7,848	1	132	1,848
Fourteen water-closets, each .....	5	3	14	15	210	7		
Six bath-rooms, each .....	9	8½	14	76	1,064	17		
Four sink-rooms, each .....	13	6	14	78	1,092	23		

We hence perceive that in the wards the area or floor surface per man varies from seventy-one (71) square feet to seventy-eight (78) square feet; and this, all our authorities tell us, is too little. The cubic capacity, likewise, is insufficient, varying from 985 cubic feet to 1,090 cubic feet per man. Therefore, if it should become necessary to occupy the hospital to its full capacity we may expect disaster from crowding. The air-space of halls, corridors, dining-room, and bath-rooms is probably sufficient.

L, C)  
FLOC





## VENTILATION.

The ventilation of this hospital is excellent. The special arrangements consist of flues in the partition walls, not connected with chimneys or with heating apparatus; one flue to each ward, with two openings, one near the ceiling, the other near the floor. The flues are kept separate, and are continued four feet above the roof. That is all. So far as we have had the opportunity to judge, the ventilation is sufficient. The largest number of patients during my service was seventy—seventenths of the full capacity of the building. There is no odor except from leaning over the offensive object, or from cooking when in or about the kitchen. We have no means of accurately determining the amount of air that passes through the rooms; but the air may generally be felt by holding the hand near the entrances of the flues; and a handkerchief is drawn against them with some force. In cold weather the air sometimes enters the flues with a rushing sound. Now, navigators tell us that it is just possible to perceive a breeze of one knot; and adopting this as the rate, we have a column of four square feet entering each opening at the rate of 6,000 feet per hour, = 48,000 cubic feet per hour. This is 2,400 cubic feet per man. Perhaps it is enough. How so much air enters the rooms is not so easily seen. There are the cracks of the windows and doors, and the porosity of the plaster; but there are no flues for fresh air, and there is no perceptible current about the rooms.

The atmosphere so generally eludes our senses that we have difficulty in appreciating its properties and mechanical movements. We cannot see it, or even feel or hear it under ordinary circumstances. We cannot see the foul air of respiration in one part of the room more than in another part; hence, perhaps, the inference that the introduction of fresh air acts merely as a general diluent. But we know from frequent analysis that the foul air ascends to the ceiling, while the fresh air occupies the

body of the room. Again, it has been inferred that carbonic anhydride (carbonic-acid gas), on account of its great specific gravity, must descend to the floor, and hence that the foul air is on the floor; but analysis makes us sure that the carbonic anhydride is principally at the ceiling. The circulation of air, about the house and about the world, is mainly controlled by variations of temperature. The foul air of respiration and of perspiration is warmer, and hence lighter, than the atmosphere of any habitable room. The temperature of respired air is  $36^{\circ}.7$ ; the temperature of the room is  $20^{\circ}$  or  $22^{\circ}$ ; and the foul air, necessarily at some intermediate degree, ascends to the ceiling. Thus foul air and fresh air separate, as oil and water do in a half mixed emulsion. And as water leaks downward through the bottom of a leaky bucket, so foul air leaks upward through the cracked or porous ceiling. And as by putting a spout in the bucket, so as to convert it into a funnel, the water is discharged more rapidly, so by building a ventilation-flue upward from the ceiling, the foul air is sufficiently provided for. We need no pump to drive the water down the spout of the funnel; we need no fan or fire to drive foul air up through a well-constructed ventilation-flue.

Some of the rooms in the old building, east end of the hospital, are very deficient in ventilation. The old fire-places were walled up when steam was introduced, so that there are no ventilation-openings except windows and doors. These rooms as at present arranged could not be safely occupied by more than two or three persons to each room.

The small-pox hospital, about three hundred yards west of the main building, is ventilated by openings through the ceiling into the loft, thus establishing a foul-air chamber. The mephitism might be expected to cool in this loft, so as to have sufficient specific gravity to bring it down again into the wards; but as it still continues warmer than the external atmosphere, its tendency is upwards till it escapes by the ridge ventilator.



## HEATING.

The warming of the main building is by high-pressure steam. The boilers are in a detached building and supply power for the washing-machine and steam-pump, besides warming the rooms. There is sufficient steam for the coldest weather. The arrangement of the boilers in a separate building is wasteful by condensing steam in the main pipes before it reaches the rooms to be warmed. This inconvenience has been remedied in some degree by covering the pipes with non-conducting material. Several rooms are warmed by a single steam-coil in each room; and this would be all right if we could moderately warm a coil by partly opening its valve, but according to my experience this is not practicable. Steam rapidly enters a cold coil, no matter how small the opening, till the coil is quite hot; and no matter how wide we open the valves it is not heated much above the temperature of boiling water. Hence in mild weather the house is inconveniently warm, windows are opened, and coal is wasted. We try to remedy this by turning on steam till the house is quite warm; then we turn it off till the rooms are rather cold; next turn it on again, etc. The only remedy that suggests itself is to have two or more coils of different sizes in each room. Then in mild weather we might heat a small coil, in cold weather a large one, and in very cold weather we might heat them all at the same time. An inconvenience of steam heating is the crackling noise produced by condensation, sometimes comparable to the noise produced by a gang of blacksmiths. I see no remedy for this noise, and habit enables us to bear it without much inconvenience.

## LIGHTING.

This hospital is well lighted by large windows. Physiologists have not yet suggested any means of determining the amount of light required for the best condition of health. The dwellers in the crooked lanes and alleys of large cities appear to suffer from deficiency of light; but the vigorous health of men work-

ing in dark mines suggests some doubt. Persons who visit Egypt, with its white sand and bright sunshine, suffer from too much light, even to the destruction of their eyes. The direct rays of the sun are painful to us as at present constituted. We need clothing to protect the surface of our bodies; we need hats to protect our eyes. Darkness gradually destroys life; and too much light may destroy it still more rapidly; *in medio tutissimus ibis*. It has been suggested that the two long sides of a hospital ward should have windows open to the sunlight; but I have generally seen such windows covered by piazzas, so that no sunlight could reach them. The windows of the wards of this hospital are all on one side and at the ends. On the other side is a partition wall with its three doors and the openings of the ventilation-flues. But there are no balconies to obstruct the light; and on bright days it is necessary to darken the wards by closing more or less the blinds and curtains.

## WATER-SUPPLY.

The water-supply is derived from the Mystic River. It is abundant and good. The usual analysis (Parke's Hygiene) enables us to make a fair comparison and estimate of the three varieties of water:

Varieties of water analyzed.	Alumina, per- manganate test.	Chlorine.	Hardness, soap test.
Snow-water.....	.35	.....	.....
Do.....	.6	.....	.....
Do.....	.5	.....	.....
Do.....	.5	.....	.....
Large cistern.....	.5	.....	1.6
Deep well.....	.75	1.77	10.8
Mystic, from dispensary.....	1.3	2.31	4
Do.....	1.1	.....	.....
Do.....	2.66	.....	.....
Do.....	3	.....	.....
Do.....	3.65	.....	.....
Do.....	4.50	.....	.....
Spring near walnut tree.....	.5	.....	.....
Spring in pasture field.....	.4	.....	.....
Saugus Lake, outlet.....	5.20	.....	.....
Drainage from laundry.....	17	.....	.....

The purity of snow-water varies according to the circumstances of collecting it. The water of the large cistern in the cellar is about as pure as snow-water, and by the soap test it appears to contain about one-third as much calcium carbonate as the water from Mystic basin. The deep well, long disused, contains excellent drinking water, though not so good as the Mystic for washing clothes. The Mystic basin commonly supplies very good water; but on three or four occasions it was hardly fit for use. The breaking up of the ice in spring fills it with mud and organic fragments, besides a large quantity of nitrogenous impurity in solution. The water of the springs is excellent. The condition of the water from Saugus Lake warns us that rivers and lakes of some size may be defiled by draining filth into them. The water from the laundry drain, settled and filtered, was a pretty strong solution of nitrogenous impurity from soiled clothing.

#### GENERAL HYGIENIC CONSIDERATIONS.

The water-closets are not near the outer walls; but on the contrary, as near the center of the building as possible—about the central corridors. The pipes from the closets pass perpendicularly downward into the cellar floor, where there is a curve constituting the trap. From this point the pipe buried in the cellar floor passes directly toward the river. The pipes are of cast iron, jointed with lead, as nearly air-tight as such work can readily be made.

Formerly there was some difficulty with offensive gases. High tides drove the gaseous contents of the pipes through the traps into the building. This was remedied by making an opening into each pipe outside of the building, and above high water, so as to allow the gases to escape into the soil and into the sea-wall. I cannot perceive any inconvenience from this source at present.

But I do not consider the plan a safe one. Sewer-gases prob-

ably cause a large proportion of our city mortality; and they enter the houses through just such arrangements, only the plumbing is not commonly so good. But even royal plumbing is not good enough to protect us from these gases, as we learn from the circumstances of the last illness of the late Prince Albert. There are more than 30,000 houses in the city of Boston—30,000 water-closets—30,000 sets of these iron pipes rusting out. Even if iron pipe lasts a hundred years, there must be three hundred of these drains giving out each year—three hundred foci for typhoid-fever epidemics—nearly one centre of typhoid infection for each day of the year. It is not quite pleasant to have these conveniences always at the far end of a long garden; but surely they might be near the external wall of the house, and the pipes might be kept out of the cellar floor.

PLAN OF —

RD AND SEAVEY'S ISLAND.

RY MAINE.

YS COURSE OF SEWERS.

C. J. CLEBORNE M. E.  
S. C.



## UNITED STATES NAVAL STATION, KITTERY, ME.

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REPORT BY C. J. CLEBORNE, M. D.

MEDICAL INSPECTOR U. S. NAVY.

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The United States navy-yard at Kittery is located upon two islands, situated on the northeast side of the Piscataqua, nearly opposite the city of Portsmouth, N. H., in latitude  $43^{\circ} 05'$ , longitude  $70^{\circ} 44' 30''$ , west from Greenwich.

The Piscataqua River was discovered in 1603, by Martin Pring, a captain in the service of the Bristol Company, a society of merchant adventurers, who fitted out two small vessels, the *Speedwell* and the *Discoverer*, for the purpose of exploring the "northern portion of Virginia." He was followed in the summer of 1605, by Samuel de Champlain, and in 1614, by Capt. John Smith, who discovered the "Isles of Shoals," and made the first chart of the coast known as New England. On the 10th August, 1622, the council established "for the planting, ruling, ordering, and governing of New England in America," granted to Sir Fernando Gorges,\* and Capt. John Mason, a merchant of London, and secretary of the said council, "all the land situated between the rivers Merrimack and Sagedehock, extending back to the great lakes and rivers of Canada, by the name of Laconia."† This was the origin of the "Company of Laconia," which in 1623, established a fishing-post at the "Cape of the Islands," or Odiores's Point, near Rye, and in 1631, settled the town of Portsmouth, N. H.

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\* Probably a descendant of Rafe Gorgis, a baron by writ temp. 2d Edw. ij. Arms: *Losengy Or and Azure*.

† *Vide* Records of York County.

In 1639, Charles I granted to Sir Fernando Gorges, "a parte and portion of ye countrie of America, more commonly called or known by ye name of New England. Ye portion of ye maine lande and premises aforesayd shall forever hereafter bee called and named ye Province or Countrie of Maine. Also, all woods, trees, lakes, rivers, and islands, within the said Province of Maine."

The two islands which now constitute the naval station at Kittery, were granted May 3, 1645, by "Richard Vines, Steward-General of the Province of Maine, in behalf of Sir Fernando Gorges, to Thomas Fernald of Kittery—the two islands lying and being on the north east side of Pischataqua River, commonly called or known by the name of Puddington's islands. The said Thomas Fernald of Kittery to pay to the Lord Proprietors of the land the sum of Two shillings and six pence yearly if demanded."\* The natural advantages of the islands, and the fine timber in their immediate vicinity, early recommended them for ship-building purposes, and in 1650, surveys were made of the harbor, and timber for masts was selected and marked with the "Broad arrow" for the use of the Crown. The first ship built here for the royal navy was the frigate Falkland, of 54 guns, 637 tons, constructed by Mr. John Taylor in 1690; and the first ship built for the Continental Congress was the Raleigh, a 32-gun frigate, whose keel was laid on Langdon's or Badger's Island, on the 21st March, 1775.† This vessel was constructed by Messrs. Hacket, Hill & Paul, under the supervision of Thomas Thompson, esq., of Portsmouth, who afterward commanded her in the action with H. M. S. Druid. Langdon's yard was used for naval purposes up to 1800, when the honorable Secretary of the Navy recommended the purchase of Dennett's Island for the site of a naval station. In

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\* Deed Book, vol. 1, p. 16, Records of York.

† Fentress, Centennial Hist. of Portsmouth Yard.







1794, this island had been purchased by Samuel Sheafe, of Portsmouth, from the heirs of Thomas Fernald, for the sum of \$650, and was sold by him to William Dennett, of Kittery, in September, 1794, for \$1,700. The island, containing 58 acres, was purchased by the United States Government in 1800, from the said William Dennett, for \$5,500, and work was immediately commenced by removing to it the naval stores from Badger's Isle, which had previously been used for ship-building under the authority of the Continental Congress.

The first appropriation for the new navy-yard was made October 1, 1800, when \$26,304 was voted for improvements. In 1801, a large timber-shed was finished, the materials from Langdon's or Badger's Isle removed and stored; a wet dock was built, and a large quantity of live oak was placed in it. In 1803, a house was erected for a dwelling, a barracks was constructed for the marines, and a bell-tower was built.\* An octagon fort of earth and heavy timber, with embrasures for eight heavy guns, was built upon the hill, and a flag-staff was erected. But little was done at the yard until 1814, when the keel of the 74-gun ship Washington was laid, and a house was built over her, now the ship-house No. 5. From this time the yard began to assume the appearance of a naval station, and its record is of more than ordinary historic interest.†

*Jenkins' or Seavey's Island*, as it is now called, adjoins the navy-yard, being separated from it by a narrow stream over which a bridge was erected in 1856. It contains 105 acres, and was purchased by the government in 1866, for \$105,000. The island (which is fortified by an old earthwork, Fort Sullivan), is generally uneven and hilly, and would require a great deal of filling in and levelling to fit it for naval purposes. It

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\* See Sketch of Navy-Yard in 1808.

† See Centennial History of the Navy-Yard, Portsmouth, by W. E. H. Fentress.

possesses a number of excellent building-sites, on which are located some frame houses and the residences of the civil engineer and naval constructor. The water-front is bold, except on the navy-yard side, where the stream is so shallow that it could readily be filled in if necessary to make the two islands one.

The entrance to the harbor of Portsmouth is easy, but there are powerful currents, especially between Seavey's Island and Newcastle. For a mile above the navy-yard, over 5 fathoms of water may be found, with a good anchorage, but owing to the rapidity of the currents and some small shoals it is dangerous navigation without a good pilot. The river is never frozen over, is seldom incumbered with ice, and is rarely troubled with fogs except in the months of August and September.

The old yard, located on Denmett's Island, is laid out somewhat irregularly with ship-houses and buildings specially designed for the use of the different Bureaus. They are mostly built in a substantial manner of brick or cut stone, and many of them (particularly the "Head-house," a fine building of undressed granite, with hammered coignes, dormer windows, and slate roof) reflect great credit upon the civil engineer of the station (B. F. Chandler, esq.), by whom they were built. The powder-magazine is a handsome structure of granite, completed in 1859. The ship-houses are said to be the finest in the country. A magnificent floating balance-dock, 350 feet long, 105 feet wide, and 38 feet high, capable of raising a ship of 5,000 tons weight, was erected near them in 1851 by Messrs. Gilbert & Secor, of New York. Adjoining this dock is a fine basin 360 feet in length by 125 feet in width, with granite walls 14 feet high, hammered beds, builds, joints, and face laid in cement; and an inclined "ship-railway" with an hydraulic engine capable of hauling up a vessel of over 5,000 tons at the rate of one foot per minute. More than one hundred ships of all sizes have been

docked here without accident or danger, and the floating-dock is to-day nearly as good as ever.

In 1857 a handsome general office and muster-room was built nearly opposite the commandant's quarters, at a cost of \$28,000, and the same year a comfortable brick lodge was erected for the ordinary men of the yard for \$5,090. The fine brick building for the use of "inspection of provisions and clothing" was finished in 1862 at a cost of \$12,580. Other spacious and commodious structures of brick, stone, and iron were erected at various times and at great expense for the use of the departments of Ordnance, Construction, Yards, and Engineering, but nothing has been done for the accommodation of the sick since 1834, when an old frame building was assigned for hospital purposes.

#### COMMUNICATION.

The islands are connected with one another and with the town of Kittery by wooden bridges, and there is frequent communication with the city of Portsmouth by means of the steam-tug Emerald. The commandant of this station is furnished by the government with a horse, carriage, and driver. The captain of the yard has the control and use of the "*ambulance*" belonging to the department of Yards and Docks, but all other officers are dependent upon the tug or their own private vehicles.

#### QUARTERS.

The quarters of the officers are eligibly situated on a high ridge extending northeast from the river front. The commandant's house, opposite the flag-staff and band park, was rebuilt in 1815, and inclosed within spacious pleasure-grounds. Originally a frame building erected in 1803 for the superintendent or master carpenter, it is (despite all changes, modern improvements, and the addition in 1872 of a handsome portico) very unsatisfactory as a residence. The lower part of the house is

the best part of it, the upper rooms being small, stuffy, poorly arranged, and extremely inconvenient. It is well supplied with steam-heaters, gas, and water; has a small conservatory heated by steam, a fine kitchen and flower garden, large yard and excellent outbuildings.

The mansion of the "captain of the yard" was originally intended for *two* dwellings, uniform in size, style, and accommodation with the quarters of other commissioned officers, but the Bureau of Yards and Docks decided to build a large, single dwelling for the officer next in rank to the commandant, and accordingly a handsome residence was erected in 1833 at a cost of \$15,000.\*

The present quarters of the commandant's aid (C), ordnance officer (D), medical officer (E), and chief engineer (F), cost about \$5,000 each, and were built in 1827. They are arranged in two blocks of *double* quarters, are roomy, substantial, painted brick buildings, very indifferently furnished, but well supplied (like quarters A and B) with cistern-water, gas, steam-heaters, inside water-closets, and bath-rooms.

On a lower ledge of rock are situated the houses of the warrant officers, also built of brick. They are much smaller, and are without interior water-closets and bathing conveniences. It has been proposed to raise these quarters one story with a mansard roof, in order to fit them for the residence of commissioned officers; but as altered houses are rarely satisfactory, it is questionable if any change will now be made. All of these houses, as well as most of the public offices, are heated by steam-coils, and are lighted with gas made in the yard. In front of all the quarters are lawns planted with trees and shrubbery, inclosed with a handsome iron railing. In the rear are outhouses, wood and coal sheds, privies built over shallow brick vaults, and beyond these are the kitchen gardens, offi-

\* In 1834 an additional sum of \$2,700 was required to finish this residence.

cers' stables, and stables and sheds for the oxen and teams of the yard. The isolated position of the station made it necessary at one time for each officer to keep a private conveyance, but the steam-tug *Emerald* now renders Portsmouth more accessible, and is a great convenience to the officials of the yard and citizens of Kittery.

Each commissioned officer's house has a large side and back yard, and a kitchen garden large enough to supply each family with potatoes and all the vegetables of the season; but the expense of hiring men to cultivate this ground is too great to be profitable. A yard gardener is usually employed to supervise these gardens, but he is so fully occupied with the conservatory, kitchen and pleasure grounds of the commandant, that he cannot give them any attention.

The service for each house is necessarily expensive. With the exception of the commandant, who is allowed his coxswain, a coachman, horse and carriage—and until recently a barge's crew of eight men, a man cook, and a steward—it costs all other commissioned officers from \$60 to \$70 per month for servants' wages. The service of a man is necessary in each house to attend to the fire-buckets, to serve with the fire-engines in case of fire, to pump water twice daily from cistern into reservoir, to attend to the garden, horse, or cow; to chop wood, carry coal and ice, and for other heavy work beyond the strength of our modern female domestics. "Help" (as servants are euphemiously termed here) is very difficult to procure, and is apt to leave at a moment's notice during the "summer season." Wages are extortionate, higher than at any other station except California. Cooks demand \$4 and \$5 per week, chambermaids \$3, and bad is the best of them even at these rates. Markets are not very good; the best of everything goes to Boston, and provisions of all kinds (save eggs, butter, and codfish) are high. Officers, as usual, are charged the highest

price for everything, and the station has become the most expensive on the Atlantic coast.

#### MARINE-BARRACKS.

On a line with the officers' quarter stand the marine-barracks. It is situated at the extreme northeast point of the island on a high ledge of rock, in front of a fine parade-ground bounded by the river. It is a painted brick structure, with a double wooden piazza, erected on the site of the "old powder-house" in 1827, and consists of a main building and two wings, the former occupied by the men, the latter by the marine officer in charge and the officers of the post.

The buildings were constructed without regard to hygienic rules or consultation with the medical authorities, and in consequence are not properly adapted for barrack purposes. The right wing (occupied by the officer in charge) is a large, three-storied mansion well lighted by gas, heated by a furnace and open fire-places, and contains inside water-closets, bath-rooms, and other conveniences. The left wing was intended for two families, but is at present overcrowded with three families and one unmarried officer. It is very inconveniently arranged, and contains two kitchens, two dining-rooms, one general parlor, the usual allowance of chambers, with but *one* water-closet and bath-room, and is lighted like the rest of the barracks with gas made in the yard.

The sewerage is bad, and the kitchen and other odors are at times very offensive. There ought to be a bath-room and water-closet on each family floor, and the culinary department should be located outside the house. In the rear are outbuildings, stables, hen-coops, and small gardens.

The men's quarters are of two stories, the lower one (under the arcade) containing offices, guard-room, cells, mess-room, and kitchen; the upper story (reached by an outside stairway) contains a clothing-room and dormitories.



The guard-room measures 28 feet 7 inches by 16 feet 4 inches by 9 feet 2 inches, and deducting furniture, twelve beds and a stove, it has a cubic air-space of 4,082 feet, or 340 cubic feet for each occupant. It is ventilated by two windows, each 5 feet by 2 feet 10 inches, and two doors, one of which opens into a corridor leading to the prison-cells, which measures 17 feet by 3 feet 5 inches by 8 feet 7 inches, well ventilated by four windows, each 5 feet by 2 feet 9 inches, with an air-space of 498 cubic feet.

The walls of the guard-room are of lath and plaster, thickly coated with whitewash, the floor is of brick, and the bedsteads are the old-fashioned double iron-bunks. It is a cheerless room in the long, severe winter season, and the bricks absorb and hold moisture. The only provision made for drying the wet clothing of men coming off post, is the use of an adjacent cell for that purpose. As bronchial affections and rheumatism are common among the occupants of this room, I would suggest the substitution of wood for the brick flooring, and recommend that an outside shed be provided for the drying of wet or damp clothing.

*Cells.*—These are six in number; the largest, known as the "Cage," measures 11 feet 7 inches by 12 feet 3 inches by 9 feet 4 inches, and contains, exclusive of furniture and stove, 1,293 cubic feet of air-space. It is ventilated by two grated windows, each 2 feet by 1 foot, and by a door opening into a corridor.

The other five cells are small, and contain but 340 cubic feet each, or little more than half the minimum allowance of cell air-space required by law nearly a century ago.

Fortunately, ventilation is secured by one iron-grated window in each cell, measuring 1 foot 8 inches by 1 foot 2 inches, a perforated space in each door, 1 foot 9 inches square, and a corridor measuring 28 feet by 3 feet 5 inches by 8 feet 7 inches. The cells are of brick, vaulted and whitewashed; the floors are of wood, and the abominable tin bucket is found in each. In

winter they are heated by a stove-pipe running through each from a large stove in a room adjoining the cage.

*Offices.*—The offices of the marine officer in charge of post, of the officer of the day, and of the orderly sergeant, contain respectively 3,042, 5,758, and 3,312 cubic feet. They are all meanly furnished apartments, are ventilated only by windows and doors, and are heated by common cast-iron stoves.

*Mess-room.*—This is in front of the kitchen and faces the parade-ground. It is designed to accommodate 100 marines, and measures 33 feet 4 inches by 24 feet 9 inches by 9 feet 2 inches. Deducting furniture, it contains 7,082 cubic feet of air-space, or a little over 70 cubic feet per man. It is ventilated by two doors and four windows, each 2 feet 10 inches by 4 feet 2 inches, and contains five plain pine tables and ten benches, each intended to seat ten men.

*Kitchen.*—The kitchen is entered from the mess-hall, and is a dark and gloomy apartment. Its walls are lath and plaster, coated like the other rooms with whitewash, and the floor is of wood except around the range, where bricks are used. It is ventilated by two doors and three windows, each of the latter 4 feet 2 inches by 2 feet 10 inches, and contains (deducting range and furniture) 3,844 cubic feet. The cooking-range is a very poor one. It was made by Bramhill, Deane & Co., and has cooking capacity for 150 men.

The kitchen should be a separate building, well lighted, and especially well ventilated, adjacent to the mess-room but separated from it by a well-aired corridor. Particular attention should be paid to the sinks and drainage of the culinary department. The cooking utensils should be inspected daily, and the utmost cleanliness and care in the preparation of food should be enjoined upon the cooks and others employed in the kitchen.

*Wash-house.*—This is an old wooden shed adjacent to the cells and kitchen, containing a wooden trough, a small hand-

pump, buckets, and tin pans for lavation. The floor is of wood, very damp and in bad condition, and the whole place is uncomfortable and unfit for its purpose. At every sanitary inspection of this barracks I have protested against its use, and hope that a change will be made.\* There are no proper bathing facilities for the enlisted men, and the excuse is that the water is "too cold," except during two months of the year—July and August. There seems to be no reason why there should not be a swimming-bath constructed here similar to the tank at the marine barracks at Washington. The sea-water could readily be introduced, and hot water might be obtained from a boiler in the kitchen. The men should be sent to the bath (daily in summer and less frequently in winter) in squads under the charge of a non-commissioned officer, and they should go with their clothes on and return dressed to avoid exposure.

Ablution-rooms should be made as convenient as possible to the dormitories, and a strict regard should be paid to personal cleanliness. It is a source of great annoyance to medical officers to find the bodies of patients, and enlisted men applying for re examination, in a filthy condition. This is not an uncommon experience in the Navy and Marine Corps at sea, but there is no reasonable excuse for such a state of affairs at this marine barracks.

*Dormitories.*—In the second story there are five sleeping-rooms and a clothing or store room.

Room No. 1 is 24 feet by 33 feet by 9 feet, and has an air-space (deducting stove and furniture) of 6,745 cubic feet, or 338 cubic feet per bed. It is ventilated by one door and six windows, each of the latter measuring 5 feet by 3 feet, and contains ten double iron bunks.

Room No. 2 is 24 feet by 33 feet by 9 feet, and has an air-space

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\*Since writing the above, a new wash-house has been built which is more convenient and comfortable.

(deducting stove and furniture) of 6,793 cubic feet, or 377 feet per bed. It is ventilated on *one side only* by four windows, each 5 feet by 3 feet, and an inside and outside door, and contains nine double iron bunks.

Room No. 3 is 27 feet 9 inches by 33 feet by 9 feet 9 inches. On one side is a blank wall, dividing it from room No. 2, and consequently, like the latter, it is ventilated on *one side only* by six windows, each 5 feet by 3 feet, and within two feet of the floor. It measures (deducting stove and furniture) 8,610 cubic feet, or 430 feet per bed, as it contains ten double iron-bunks.

Room No. 4 (music-room) contains (deducting stove and furniture) 3,312 cubic feet of air-space, and is ventilated by two windows, each 5 feet by 3 feet, and one door opening on the verandah.

Room No. 5 (orderly-room) contains (deducting stove and furniture) 3,400 cubic feet of air-space, and is ventilated by three windows, each 5 feet by 3 feet, and by one door opening on the verandah.

The "clothing-room" contains 3,042 cubic feet.

Dr. Parkes considers 3,000 cubic feet of fresh air per hour necessary to properly dilute the air expired by an adult, and this amount should be allowed in a properly-built hospital; but for barrack purposes General Morin fixes the amount at 1,053 cubic feet by day and 1,755 cubic feet by night. It will be seen that the greatest air-space per man in room No. 3 of this barracks is but 430 cubic feet, an amount decidedly insufficient in a northern climate except in the mildest summer weather. As there are no special arrangements for ventilation in any of the dormitories or offices, they have frequently a heavy and unpleasant smell. In the wards, within an hour or two after the men have turned in, the "barrack-odor" is unmistakable, and in winter is simply horrible. My calculation for air-space is made on the *minimum* number of men at this barracks, so that in the

event of a larger body of troops being sent here sickness would be inevitable. The large window-space is found useful in cooling the rooms in summer, but in our long and severe winters it cannot be made available for ventilation without producing colds and rheumatism. It was decided by the English Royal Commission that 600 cubic feet of air-space (of which at least 60 feet should be surface area in sleeping apartments) was the *minimum* allowance for each man in barracks, but even if we had this allowance it would be useless without a regulation similar to that in the British army, which provides that each room shall have marked upon the door the number of men it is intended to accommodate, and forbidding any increase of that number by the commanding officer. "But," says Dejobert,\* "the mere allowance of cubic space to men is insufficient; no good can be obtained without a regular and constant ventilation, independent of the care of superintendents or of the will of the soldier, and this ventilation should be combined with heating for the seasons that demand it." I would therefore recommend the introduction of steam-coils into this marine barracks in place of the present cast-iron stoves. The change could be effected at a slight expense by connecting them with the large steam-heating apparatus of the navy-yard. Ventilation might be combined with the heating by surrounding the coils with air-chambers, and by separate ventilating tubes and foul-air shafts reaching from the ceiling to latticed ventilators in the roof, the lower opening in the ceiling to be fitted with a register to control the air. The windows in room No. 3 are very badly arranged. They come within two feet of the floor, are on a level with the lower tier of bunks, and are a fruitful cause of catarrhal complaints. The lower sashes of these windows should be closed, and proper arrangements made for ventilation. The entire barracks is lighted by gas, and this is another source of

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\*Annales d'Hygiene, 1848.

air contamination.\* Over 3,000 cubic feet of air per hour are required for a single burner, yet no provision has been made for carrying off the products of combustion. The wonder is, with such confined air-space, the emanations from the breaths and bodies of the men, the carbonic oxide from the heated cast-iron stoves, the deterioration of the atmosphere from the gas and other causes, that there is not more sickness. It is certainly a conclusive proof of the ability of man's constitution to resist disease and to exist under circumstances which are so inimical to animal life.

The two-storied iron bunks used by the men ought to be at once done away with, and a modification of the Wallen or Prussian bunk introduced. A *folding* bunk, made altogether of round galvanized-iron wire, is less likely to be infested by vermin than others, and it would take up much less room if fastened within 6 inches of the wall and made to turn up or down, so as to form seats for the men in the daytime. The mattresses are made of common "ticking," filled with straw *supposed* to be changed once a month. Straw makes a harsh and uncomfortable bed, and much better and equally inexpensive substitutes might be found in the "Florida moss" and "Cat's-tail." The blankets issued to the men are usually of fair quality, but they are scarcely warm enough in this climate without a quilt or "comfortable." In the interest of health, comfort, and cleanliness I would strongly recommend an additional issue of a pair of good sheets to every enlisted man.

In the rear of the men's quarters are coal-sheds, latrines, sta-

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\* The vapors arising from the combustion of coal-gas are very deleterious to health, and when condensed into liquid form half an ounce to every foot of gas burned. The noxious substances—sulphurous acid, carbon, &c.—may be condensed into water, for which they have great affinity, and an apparatus has been devised by which the deleterious products of combustion may thus be eliminated, and at the same time made to heat and ventilate the room.

bles, carpenter-shop, straw-loft, hen-coops, ice-house, wharf, and boat-houses containing two large boats for garrison use.

The latrines are in a small brick building, 11 feet 6 inches by 6 feet 10 inches by 8 feet, covering a shallow, uncemented brick vault, over which is the ordinary wooden seat, with five round holes. The flooring is of wood, and there are no ventilating-flues. At the back of the vault there is a trap or door, which may be opened to remove the contents of the vault. Near by is the urinal, a wooden trough lined with zinc, the odor from which is at times very offensive. The latrines are not well kept, in consequence of the present reduced police force of the barracks. I would recommend doing away entirely with the present arrangements, using in their place the double zinc boxes of the Army, with dry ashes as a disinfectant, or stalls might be erected over tide-water, with triangular openings (16 inches long, 4 inches wide behind, and 2 inches in front) cut in the wooden superstructure.\* These buildings should be connected with the main building by a long, well-ventilated corridor, so as to protect the men from inclement weather.

The fences, grounds, walks, &c., in the rear of the barracks are in very bad order, while in front everything presents a neat and even handsome appearance. On the left of the parade-ground is the post-bakery, a wooden building, 25 feet by 15 feet, containing an oven, kneading-trough, and other utensils, fully equal to the requirements of the garrison. The barrack-well is immediately in front of the "arcade," and produces an abundant supply of the best drinking-water on this island. The rain-

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\* This suggestion has been partially acted upon. A temporary water-closet has been built over tide-water, but a corridor is necessary for winter use. The soil-pipes from the water-closets in the wings and the drains from the kitchens empty into a common brick and wood sewer, which runs along the back of the barracks and carries the sewage into the river just below the exit of the sewer from the lower quarters in the yard. This sewer should be removed and replaced by one properly constructed of brick or vitrified pipe.

water from the roofs is collected in a large cistern, situated in the cellar underneath the kitchen and cells, and is usually sufficient for washing purposes. On the extreme right of the parade-ground are the stables of the marine officer in charge of the post. The coach-house and stables are in one large frame building, the ventilation of which might be improved, but it is otherwise well adapted to its purpose.

#### POST-GARDEN.

This is situated on Seavey's Island, and is cultivated by a detail made from the marine guard. It is sufficiently large to supply the enlisted men with potatoes and fresh vegetables, and is an excellent means of recreation for the men.

#### RATIONS.

The food provided for the enlisted men of the Marine Corps is in quantity and quality the same as that of the Army. It compares very favorably with the ration issued to foreign troops, and has the advantage of greater variety. The ration is supplied by general contract, and now consists of bread or flour 18 ounces, fresh beef 1 pound 4 ounces, pork or bacon 12 ounces, rice 1.6 ounce, coffee 1.6 ounce, sugar 2.4 ounces, beans 0.64 gill, vinegar 0.32 gill, salt 0.16 gill. In addition to the above, 1 pound sperm candles and 4 pounds soap are issued with each hundred rations. Extra issues are provided out of the post fund, and vegetables are supplied in summer from the post garden. As pork is served out three times a week, and fresh beef four times a week, one would suppose that mutton would be an agreeable change, but the experiment has been tried, and as a rule the men do not care for it. The present ration is deficient only in bread and potatoes, and the Army standard in 1863, of 1 pound 6 ounces of the former, and one pound of the latter (three times a week on pork days) should be again



adopted. Food must supply material for the development of the body, as well as for the potential force which becomes converted into dynamic energy. There must therefore be a sufficiency of nitrogenous matter to construct and repair the tissues, and to produce brain and muscle, and in a cold climate like this, a greater allowance of carbon than is found in the present ration. A man performing ordinary labor in a mild and equable climate requires daily 5,688 gr. of carbon and 307 gr. of nitrogen, while a well-fed artizan must have 5,837 gr. of carbon and 400 or 450 gr. of nitrogen. The marine ration will yield 460 gr. of nitrogen, and but 5,581 gr. of carbon, which is not a good proportion, though infinitely superior to the ration of the English soldier in time of peace, which contains 5,246 gr. of carbon to 214 of nitrogen.\* The addition of potatoes and an increase in the bread or flour, as previously recommended, with an occasional issue of good cheese, would make the marine ration all that could be desired to meet the requirements of physiology and hygiene.

Good cooking is of as much consequence as the quality of food. Three cooks, selected from the enlisted men, are usually employed in the kitchen, and have, while serving in that capacity, "general liberty" and other special privileges. These inducements, however, will not attract men who have a knowledge of cookery, and in consequence the best of provisions are frequently spoiled. At every permanent post one "head cook" should be employed, and the outlay would be more than compensated by the reduction in biliary and gastric disorders now caused by greasy soup and uncooked beans.

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\* It is not in the quantity, but in the quality of food, that we must find the greatest amount of nutriment. The ration of the British soldier, with his  $\frac{1}{2}$  pound of meat and a pound of bread is considered liberal, but in reality it is not so good as the nourishment derived from the 2-pound black loaf of the German soldier. The nutritive principles of the former ration may be fixed at 23.52 ounces against 32.96 ounces of the latter, and the German allowance is still further increased by the issue of *Erbwurst*, a pea-sausage, which contains a large amount of nitrogenous material.

A very bad practice exists at this post (and probably at others) of boiling over the grounds of previously-made coffee with the fresh material under the impression that it "adds to the strength." The result is a bitter "black broth" which is of very little use as a stimulating or refreshing beverage. Coffee should never be boiled, as violent boiling injures it considerably. Boiling water is capable of removing all its soluble aromatic constituents even at a temperature of 195° Fah.; it should, therefore, be poured over the roasted powder (not, as is commonly the case, put in first) and kept stirred, *gently simmering* for four or five minutes, when a portion should be poured out and returned again, and this operation repeated three or four times, after which, if allowed to repose a few minutes, the coffee will be found clear.

#### CLOTHING.

The present allowance for each enlisted man for five years (the period of enlistment) is 1 full-dress hat, 2 pompons, 3 undress caps, 4 fatigue caps, 7 ornaments, 2 full-dress coats, 3 undress coats, 2 sets of epaulette bullion, 5 fatigue jackets, 1 overcoat, 20 pairs gloves, 8 blue woolen trousers, 8 linen trousers, 10 blue flannel shirts, 11 linen shirts, 10 cotton-flannel drawers, 10 pairs of woolen socks, 15 pairs of shoes, 2 blankets, 1 pair of arctics, and 1 storm cap. This is in accordance with a recent change in the uniform and clothing of the corps, which in many respects is an improvement upon the old issue.

I would suggest that one pair of arctics a year be allowed at this station (a pair will certainly not last more than one winter season), and one pair of long, thick-soled boots for winter use might be substituted with advantage for two pairs of shoes. The latter are usually of poor quality, and a pair will rarely last over two months' ordinary wear. Four pairs of socks per year are necessary. The present article is not of good quality, and

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is too thickly sewed at the toes. Both woolen and cotton socks should be furnished by the quartermaster, as it is impossible for some men to wear the former without serious discomfort, and in many instances they produce irritation and blistered feet. White or gray flannel or merino undershirts and drawers should be substituted for the fluffy blue flannel shirt and canton-flannel drawers. The latter is not warm enough for this climate after the nap is removed by washing and wear, especially when worn with thin linen pantaloons. At northern stations two overcoats are necessary during the period of enlistment, and it would be well to return to the old quinquennial issue of ten pairs each of linen and blue flannel trousers. The new visorless cap should be used solely for fatigue duty, never on drill or post duty when the sun or snow may severely affect the eyes.

#### POST-FUND.

This is managed by the post treasurer, under the direction of the officer in charge of the barracks, on whose warrant it is disbursed for specific purposes. It is generally used at this post to supply vegetables and other articles not on the allowance table, and for the purchase of papers for the post library.

#### AMUSEMENTS.

There is a small library, and a few papers are supplied out of the post-fund. The men generally amuse themselves with cards and checkers, and ball-playing has been introduced by the present officer in charge, Lieut. Col. T. Y. Field. No religious services are held or encouraged at the barracks, and the men do not appear over well contented with their lot. There is less drunkenness than formerly, and but few men are confined in the prison cells. Known abuses are usually promptly corrected, and the company officers appear to do all they can for the welfare and comfort of their men, but the latter evince a distrust-

ful timidity in expressing their grievances, as if they feared to say anything concerning their food, health, or comfort. A notable change for the better usually takes place after each sanitary inspection—greater care is exercised in the inspection of food and cooked provisions, and a multiplicity of orders are issued, the good effects of which are in inverse proportion to their number, yet there appears to be a general desire to co-operate with, and to carry out the suggestions of the medical officer of the station.

#### POST-HOSPITAL OR SICK-QUARTERS.

In 1834, an old frame house at the southeast extremity of the island, adjoining the inclosure of the marine-barracks, was fitted up as a temporary hospital. It was formerly occupied by the lieutenant of the yard, and was probably built about 1802. Its present dimensions are 40 feet by 30 feet, and it contains a basement kitchen which is low, damp, and leaky, a small scullery or wash-house, two rooms used as quarters by the apothecary, a dispensary, and two small wards. There are no bath-rooms nor laundry, and no proper conveniences for the sick. The only water-closet is situated at the side of the main building, next to the summer kitchen, and consists of a shallow vault with a wooden superstructure. Adjoining the water-closet is a small frame building (formerly a store-room) which is used for surgeon's office. In summer most of the cooking is done in the scullery, but in winter the basement kitchen is used, and the odor of provisions boiling and baking is at times sickening and offensive to patients. The building is lighted by gas introduced from the yard, and a large cistern in the basement kitchen furnishes an ample supply of water.

The wards are warmed by stoves and ventilated only by windows and doors. They are so liable to draughts from the old rickety window-frames and the cracked and rotting walls that

screens have to be used around patients' beds during the winter season.

Number 1 ward, running north and south, with an eastern exposure, measures 29 feet 2 inches by 15 feet 6 inches by 8 feet 3 inches, equals 3,729 cubic feet 8 inches, and contains 8 beds. Deducting chimneys, beds, stove, and furniture, equals 122 cubic feet 7 inches, this gives about 450 cubic feet of air-space per bed. The ventilation is secured by eight windows, each 5 feet by 2 feet 6 inches, and two doors.

Ward No. 2, running north and south, with a western exposure, measures 29 feet 2 inches by 23 feet 6 inches by 8 feet 3 inches, equals 5,654 cubic feet 8 inches. Deducting stairway, chimney, stove, furniture, and twelve beds, equals 238 cubic feet 10 inches, there remain 5,415 feet 10 inches, or about 450 cubic feet for each occupant.

Into these two wards over 27 patients have at times been crowded, thereby reducing the air-space to 371 cubic feet per man—an amount nearly *nine* times less than is considered necessary by modern sanitarians.

There are no accommodations provided for commissioned officers, yet on more than one occasion it has been found necessary to receive and treat them in this hospital. There are many objections to sending patients to Chelsea, especially acute, febrile, and pulmonary cases, and it would be equally improper to remove severe injuries or fractures. Proper provisions should, therefore, be made for officers and men.

The object of a hospital is to insure "*the recovery of the largest number of sick men to health in the shortest possible time.*" This is next to impossible in quarters cursed with the evils of "hospitalism." The walls of each ward in this establishment (covered with an absorbent, friable plaster and several layers of wall-paper) are thoroughly impregnated with dust and disease germs, the accumulation of forty years. To the impurity of this

pest-laden atmosphere, and imperfect ventilation, may be attributed the slow convalescence of patients, the asthenic type of all diseases, and the tendency of pulmonary affections to run into empyema and pneumonic phthisis. This building is now so utterly unfit for habitable purposes, that the more it is shingled and patched the worse it becomes, and it would be a waste of money to make further repairs.\* In the wards the floors have dry-rotted and are unsafe, the ceilings are tumbling down, the walls "sag" and open, and the woodwork is so infested with "bed-bugs" as to render the sleep of patients uncomfortable. So intolerable is the latter nuisance, against which all remedies appear to be ineffectual, that I have transferred patients to Chelsea Hospital merely for the sake of increased comforts and freedom from this nocturnal annoyance. Take it altogether, it is a most wretched receptacle for human beings, and is a standing disgrace to the Navy.

Notwithstanding these evils, nearly 100 cases of disease and injury are annually under treatment in these wards. The number of sick treated each year at the dispensary (shown by the mean of the annual number of sick-days for the past three years) is 2,689. This includes seamen and apprentices from the receiving-ship, marines in garrison, and officers of the station, but is exclusive of "first dressings" for yard employes and visits to officers' families and servants. Fully one-third of the expenditures of medicines and medical stores must be credited to the latter, and the amount of prescription work involved is suffi-

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\*After forty years of neglect the munificent sum of \$500 is now being expended on the hospital, and changes are made, as usual, without any reference to the comfort of the sick or the wishes of the medical officer. The roof has been entirely resingled, a water-closet has been put into the west ward (which will render that almost untenable), a wooden sewer has been laid in the yard, a dumb-waiter made for the kitchen, and the board walk repaired. It is only fair to say that this building (as well as the pest-house and quarantine hospital) does not belong to the Bureau of Medicine and Surgery. These buildings are in the Department of Yards and Docks, and are merely loaned for hospital purposes.



cient to occupy the greater part of the time and attention of the apothecary. One female cook is employed at the hospital, and the apothecary acts as purveyor. One man is nominally borne upon the books as a *nurse*, but as his services are principally needed in the kitchen, he is in reality a scullion. The nursing of patients consequently devolves upon convalescents, to the great detriment of the sick and the financial injury of the government. Two nurses and one laborer are required at this station. The former should be for exclusive attention upon the sick, and the best authorities agree that one nurse should be allowed for every ten patients in hospital.

There is no conveyance at this establishment for the use of the sick and wounded. The ambulance (a misnomer for yard-carriage) belongs to the Bureau of Yards and Docks, is under the exclusive control of the captain of the yard, and is not used for hospital purposes. As a favor it may be obtained to convey a patient to or from the railway station, but for the transportation of provisions, the airing of convalescents, &c., it is never used at this station.

A small post-hospital (for four commissioned officers and twenty enlisted men), could be erected on the present site for about \$8,000. The brick building known as the "paint-shop" could be utilized as a "pavilion," by connecting it with a two-story edifice (as in annexed plan) which would provide quarters for an assistant surgeon, apothecary, nurses, and rooms for commissioned officers. The administration or executive building might be constructed of brick, galvanized iron, or carbolized wood rendered fire-proof by silicate of soda and chemical paint. The foundation of the rocky bed, if uneven, should be filled in with concrete, and covered with a layer of sand one foot deep. On this a vaulted rough-stone or brick basement four or five feet high should be raised, and upon this substructure the executive building should be erected. The walls should be double, with

air-spaces between, and be well provided with double "Louvre" windows. Inside, they should be hard finished and silicated, and the ceilings ought to be slightly vaulted, without corners or edges, to avoid the accumulation of dust. The wards should not, in this climate, be over 13 feet high, with ridge or other ventilation; the floors should be of white ash, silicated, oiled, and waxed. Heating would best be accomplished by steam-coils arranged under or near each bed, with registers to increase or diminish the heat at pleasure. While the temperature of a ward should not be too great for comfort, a sufficient amount of heat is necessary to warm thoroughly the incoming fresh air, and distribute it freely enough to produce proper ventilation. Stoves should be avoided if possible, but one or more open fire-grates would materially aid the ventilation and add considerably to the comfortable appearance of the ward.

There is a form of open stove which is economical of fuel, is easily managed, and so constructed that it promotes an active circulation of air.\* The latter is a very important point, as it secures an equalization of temperature which is essential to wholesome warming. This double stove has a large drum placed above the fire, surrounded by a jacket, so arranged that a constant supply of fresh air may be brought into contact with greatly expanded surfaces which absorb the maximum quantity of heat, and impart it rapidly to the inflowing currents, thus preventing overheating, and at the same time supplying the room with an abundant, genial, and invigorating atmosphere.

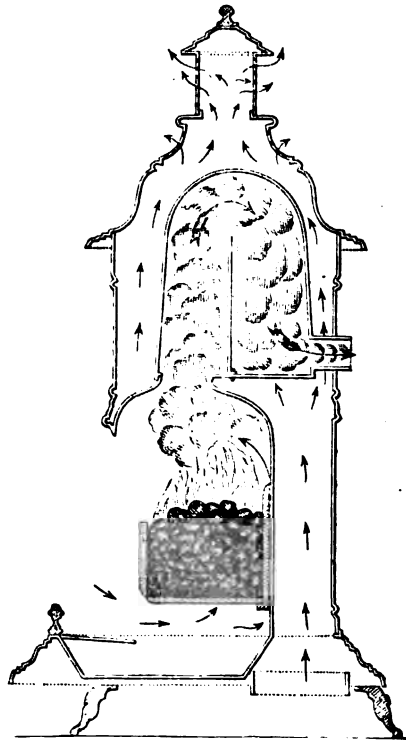
Two distinct currents pass through the stove. One enters beneath the grate, ascends to the chamber above, passes over the diaphragm therein, and thence goes to the chimney furnishing the draft. The other enters under the stove and becomes heated by contact with the hot surfaces, and rises through the jacket, thus compelling a constant circulation through the

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\*Made by the Ventilating Stove Company of New York.

latter. The fire is entirely open, so that a large supply of additional heat is radiated therefrom. There is no opportunity for the escape of carbonic acid, nor is there any contact of highly heated plates with the air of the room to generate the deleterious carbonic oxide. To secure an absolute uniformity of temperature in the ward it would be necessary to take air from the bottom of the room and from out of doors at the same time. This may be accomplished by a short pipe carried through the floor, between the joists, the joists forming the sides of a fresh-air duct, which should open to the external air, and be provided with a valve to be controlled at discretion.

One or two of these stoves in a ward would completely renew the air, and the frequency of renewal might easily be increased by means of supplementary foul-air flues or ducts, with registers near the floor. Steam for heating purposes, and gas for lighting, could be introduced from the yard, and the present cistern would be large enough for laundry uses. Ample bathing facilities, a steam-bath, and hot and cold water should be supplied, and earth-closets would be preferable to privies or latrines. The "pavilion," surrounded by a verandah, should be connected with the main building by means of a "*solarium*." This would make an



excellent "operating theatre," and it could be used as a smoking or lounging room by convalescents. The influence of a sun-bath in promoting convalescence is acknowledged, and here patients might exercise, and enjoy the health-giving rays of the sun, without disturbing other cases which needed quiet and repose.

Everything about the hospital should present a bright and cheerful appearance. If painted it should be of a light buff or lead color, with darker bases and moldings; the interior wood-work of pure white (China gloss), or very delicately tinted with blue or green. The ward walls might also be tinted a very delicate shade of blue, as it softens the light and is more agreeable to the eyes than the glare reflected from a white wall. The outside grounds should be neatly laid out with gravelled walks and sodded borders, and the whole enclosed within a fence or iron railing.

The present medical staff consists of one surgeon, one apothecary, one cook, and a nurse. The isolated position of the station and its duties require for efficiency one chief medical officer, one passed or assistant surgeon, an apothecary, two ward-masters, one cook, a scullion, and one laborer.

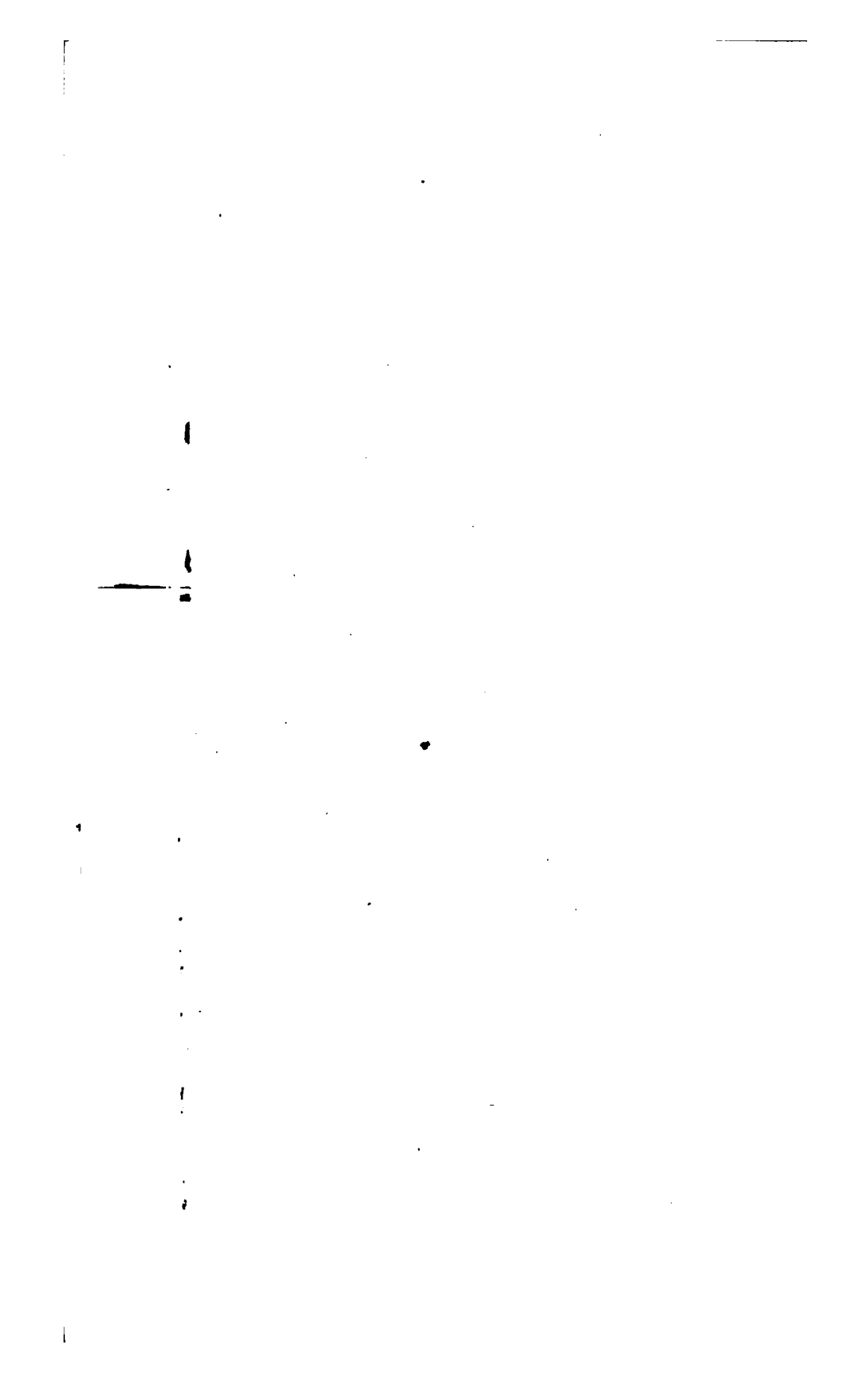
#### GENERAL HOSPITAL.

On the eastern extremity of Seavey's Island is an excellent site for a small general hospital.\* The view is extensive and handsome, the soil the best on the island, and the ground gently sloping towards the river would require little or no drainage. There is a well of the finest water, and an abundance of trees and shrubbery within the four or six acres which would be available as grounds for the hospital.

A small establishment for four commissioned officers, and twenty beds for enlisted men (with an allowance of 3,000 cubic

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\* *Vide* plan of navy-yard and Seavey's Island.





feet of air-space per bed), could be erected of brick or granite for \$35,000.

Assuming the correctness of Pettinkoffer's views, brick would be the best material for construction, but the walls should be *double*, so as to allow of a stratum of air between them. The inside walls should be "hard finished" and silicated over manilla felting. The ceilings should be made vaulted and double (with registers over the burners to allow the escape of the products of gas combustion), and should not exceed 14 feet in height. The stairs should be of stone or iron, and the floors of the halls and wards of close-grained ash, caulked with cement or "chunam," the pores of the wood well filled in with water-glass, and then rubbed with a mixture of boiled linseed-oil and beeswax. The general heating and ventilation might be combined by a slight modification of the plan adopted in the "Herbert Hospital," and there should be two open fire-grates or stoves (such as I have already recommended) in each ward. Light is quite as important as ventilation, but in a climate like this, the number of windows must be carefully regulated by the extent of each ward. It has been calculated that one square foot of glass will cool 1,279 cubic feet of air as many degrees per minute as the internal temperature exceeds that of the external air; therefore it would be necessary to have the windows of medium size, and but one should be allowed for every two beds. Double Louvre windows are best, and they should come within 3 feet of the ward floor. The circular window is a very good form for *hot climates*. The circular sash should swing on a pivot in the centre, or the two halves of the circle should open outwards, so as to act as a wind-sail and catch the passing current of air.

The pavilions of the hospital should be united to the executive building by means of double-glazed corridors or solaria, which could be used as smoking-rooms for patients, where they could enjoy at all times of the day the beneficent influences of light, air, and a sun-bath. Convalescents should not be cooped up

like prisoners, nor should they be allowed to disturb or worry the sick by their presence in the wards. Everything about a hospital should be made as bright and cheerful as possible, hence the necessity for ample pleasure-grounds where patients may take daily recreation, and be provided if necessary with such out-door employment as may tend to facilitate recovery. The kitchen and laundry should be separated from the wards and main building so as to avoid offensive odors, or they may be placed in an upper story where their fires may aid ventilation as suggested by Billings for army hospitals. For small establishments earth-closets are better than water-closets or latrines, but the room in which they are placed should be properly ventilated. A dead-house and stables would be necessary, and provision should be made for one or more cows.

The distance from the navy-yard proper is about one and a half mile, and the site is easy of access by land and water. Patients could be landed from ships on their way up to the yard, and in the event of contagious disease at the hospital, a sanitary cordon might be established and complete isolation secured.

In designing a hospital for this station I have chosen a style of architecture which I do not think has ever been adopted for structures of this character. My object was to secure as high a pitch as possible to avoid the accumulation of snow on the roofs and towers, an important point in this northern climate. The towers at the angles of the ward pavilions may be made very useful for ventilating purposes, and they isolate to a certain extent the water-closets, bath-rooms, and store and ward-master's rooms, thereby increasing the space of the ward. The sick are entirely separated from the executive building by means of glass corridors or solaria (which answer the purpose of convalescent-wards, and can also be used for operating), while the laundry, kitchen, dead-house, and pest-house are removed as far as possible from the main building. The wards have an



east and west aspect, and might be surrounded by an open or closed verandah, but I have not thought this necessary, as the solaria will be sufficient for the indoor recreation of patients.

#### QUARANTINE HOSPITAL AND STATION.

"The year of the yellow malignant fever," A. D. 1798, will be ever memorable in the annals of New Hampshire. In July of that year the disease was first brought to Portsmouth in the "good ship Mentor," from the island of Martinique. It was of a very malignant type and nearly depopulated the north part of the town. "In two months there were 96 cases, of which 55 proved fatal, and nothing was heard there but the groans of the sick and the awful shrieks of the dying." Since that time nothing so serious has happened, but the continued arrival of vessels from the South with yellow and bilious fevers caused much alarm and called attention to the necessity of establishing a quarantine. On the 12th September, 1863, the U. S. S. Alabama arrived in the lower harbor with yellow fever on board, but the cases were of a light nature, and she came up to the yard on the 10th November, 1863. On the 16th June, 1864, the U. S. S. De Soto arrived from the Gulf, steamed up to the navy-yard, and preparations were made to put her out of commission. Several of her crew had been attacked with yellow fever, but had been transferred during her passage north. On the 27th the U. S. S. Tioga came into the lower harbor with fever on board, and was taken charge of by the board of health. On the 30th the De Soto was removed to Wood Island, at the request of the health authorities of Portsmouth, and the crew of the Tioga was removed to a temporary barracks on Seavey's Island. The disease, however, had already broken out among the men employed upon the De Soto, and many cases proved fatal. On the 2d of July the mayor and aldermen of Portsmouth requested that the sail-loft in the yard be closed, owing

to several cases of yellow fever having appeared among the workmen employed there. This was done promptly, and all work was suspended owing to the difficulty of procuring men. The disease having appeared in the vicinity of the yard, the most intense excitement prevailed. Great inconvenience was caused the government, owing to the fears of the workmen, and the danger to which nearly two thousand men employed on the yard were exposed. Fortunately the fever was arrested on this occasion, but no measures were taken to provide a hospital or quarantine station until July, 1869, when the town of Kittery gave to the United States, for quarantine purposes, a barren reef known as "Wood Island," situated at the mouth of the harbor. This was a cheap piece of philanthropy, as I find that an act was passed by the legislature of Maine, on the 23d February, 1827, ceding "Whale's-back Ledge, and the ledge known as Wood's Island, to the United States," reserving only to the State the right to serve civil processes. In July, 1869, an order was received from the Bureau of Yards and Docks, to "erect with all possible dispatch a building upon the island (given by the town of Kittery) for the use of the sick, who are expected to arrive at Portsmouth in about a month or five weeks from this date." Accordingly Mr. B. F. Chandler, the civil engineer of the yard, took charge of this work, and in thirty-two days, at a cost of \$2,500, he transported from Seavey's to Wood Island the old wooden barracks (formerly used as negro quarters), which was immediately fitted for the reception of patients. The main building is 132 feet in length by 19 feet in width, and is divided into three wards. The cook-house is 25 feet by 15, and has a small sleeping-room in the attic. It is provided with a large galley or range, closets, sinks, &c. The dispensary and store-room is 22 feet square, and has two small rooms in the attic. There are also quarters for the watchman, some sheds, and outhouses, privies, and wooden tanks for rain-

water. The wards are heated by large cast-iron stoves, and the walls are whitewashed. No arrangements were made for ventilation, for that was supposed to be needless where the wind could whistle at its own sweet will through the cracks and crevices of an old frame shell. This flimsy structure, exposed to the storms and rough weather of the coast, is now greatly dilapidated. The foundations are settling and giving way in every direction, the sides of the wards sag and gape, the roof is leaky, the floors are broken, and the doors and windows afford little protection from the weather. Despite the iron supports and braces, the main building has lurched so much to one side as to be unsafe, and it is liable at any time to be destroyed by a gale of wind.

A more bleak, barren spot can scarcely be conceived. It is difficult of access in the winter season, is inconveniently situated at all times, is unnecessarily distant from the navy-yard, and is too much exposed to the violent storms of the coast. It is certainly no place for sick men, and the Lancaster and Kansas, which arrived here with yellow fever in 1874, preferred treating their cases on board. The only use of the island appears to be for "chowder-parties," who feast here during the summer, and find the hospital buildings very convenient. A watchman is employed at \$730 per annum to guard this pile of shingled lumber, which at the best is only fit for fire-wood, and will probably never be used again for hospital purposes.

If a small general hospital was located on Seavey's Island, cases of yellow fever might be removed to it immediately on arrival. Experience at the Pennsylvania Hospital proves that there is no danger from personal contagion if *fomites* are not brought in the clothing of the sick. I would, therefore, anchor ships in the lower bay, leave them there until cold weather, and after taking down fresh clothing to the sick, I would immediately remove them to the hospital.

At present I would recommend the removal of the quarantine hospital and pest-house to the little green isle\* opposite Seavey's Island. This could probably be purchased for a small sum or exchanged for Wood Island. Here the isolation of the sick would be complete, yet within easy access of the navy-yard by means of a hospital-boat. A small administrative building and kitchen might be erected on Clark's Island, and hospital-tents would afford temporary accommodation in cases of yellow fever.

#### PEST-HOUSE.

This is a small frame house belonging to the Bureau of Yards and Docks, situated on the eastern extremity of Seavey's Island, near the river front. It was fitted up temporarily by the Bureau of Medicine and Surgery, for the accommodation of six small-pox patients, but fortunately there has been little necessity for its use, though *variola* is not uncommon in the neighboring towns of York and Newcastle. It contains at present but four iron bedsteads, bedding, and hospital-stores, which are placed in charge of a sergeant of marines. This man and his wife were selected and approved of by the Bureau, on account of their having had small-pox, their willingness to take charge of the medical property, and to nurse any patients, for the privilege of occupying the house. As the present occupant is dissatisfied and is about to leave, I would recommend that small-pox cases be in the future sent to the pest-house at Newcastle, and that arrangements be made with the health authorities to receive them at a specified charge.

#### NAVAL CEMETERY.

On the northeast point of the navy-yard, near the bend of the back channel, lies the cemetery. It is a small, uneven patch of ground enclosed within a wooden fence, and in appearance is in

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\* Clark's Island, *vide* map of Seavey's Island.

keeping with the hospital. The graves are shallow and the soil unsuitable for burial purposes. It is a well-observed fact that the rapid decay of bodies depends largely upon the facility for change of air, hence rubble and sandy soil cause decay much quicker than marl or clay. The coffins in this ground should therefore be covered with a layer of quicklime and ashes, and with four or five feet of rubble over which sod should be placed. Quite a number of officers, seamen, and marines are buried here, to some of whom headstones of marble and of wood have been erected. Many of the latter are in a state of decay, and should be replaced by zinc tablets, which are cheap and will stand the weather. The graves are in a shocking condition; some have fallen in and almost disclosed their contents; in short, the place is kept in bad order, and presents a forlorn, neglected appearance. A remedy for these evils would be to transfer the care and control of cemeteries and the burial of the dead to the Bureau of Medicine and Surgery, where they appropriately belong.

#### SEWERAGE AND DRAINAGE.

Owing to the general conformation of the islands and their gradual descent toward the river, but little drainage is found necessary. The cellars of the officers' quarters are blasted out of the rock, and the surface and other water is removed by wells sunk in each side yard, which act as drains and keep the cellars and foundations of the houses dry. The sewerage of the yard is very imperfect, and sets at defiance all the modern rules of sanitary engineering. The main sewer, three feet in diameter, extends from the quarters of the commissioned officers to the northwest side of the navy-yard, where it empties into the river about eighty yards below Kittery bridge. It was finished in 1853, is made of brick laid in cement, and has but one sigmoid trap in its whole course. The grade is very irregular, and owing to insufficient trapping and absence of ventilating-flues the sewer

becomes at times a nuisance to the yard and Kittery. It is occasionally "flushed" from the water-closets by a stream of water forced through the hose of a steam fire-engine. This gives *temporary* relief, but the present sewer should be replaced by one made of vitrified pipe, furnished with proper ventilating-shafts, to render the gas harmless by freely diluting it with atmospheric air. Into the main sewer empty the soil-pipes of the inside water-closets, the kitchen-drains, and the conduits of the privy-vaults. Most of the latter are made of wood, and are protected by an iron grating to prevent the passage of improper refuse. The privy-vaults are made of brick, about 6 feet by 4 feet in size, and are covered with the old-fashioned wooden superstructure with round holes and lids. They become very offensive at times, obliging the families to leave the back of the house and close all the windows. Servants and others sleeping in the rear of the house complain frequently of nausea and headache. Flushing the water-closet partially and temporarily remedies the evil, but as the main sewer is tapped but once in its entire length, there is a return of the offensive gases, which becomes positively intolerable. The inside water-closets are furnished with the ordinary sigmoid trap, but there is no doubt a constant escape of foul gases, especially when the trap becomes partially unsealed by pieces of rag or paper lodging on the exit side as will frequently happen when the force of water is insufficient to cleanse the down-pipe. The introduction of the Jennings closet and of proper ventilators (in which the illuminating gas of the bath-rooms could be utilized) would effectually prevent danger from the slow and insidious poisoning of sewer-gas, and ventilating-flues should also be placed in the outside privies to dilute the gas with atmospheric air, and so render it innocuous.

The cellar drainage and material from the sinks of the "lower quarters" empties into a short sewer which runs from these

houses in a northeasterly direction, and discharges itself into the back channel near the powder-magazine. Each house has a brick privy-vault situated in the rear, which is cleaned out twice a year and the contents disposed of for agricultural purposes. The hospital-vault is also of brick, and its contents are disposed of in a similar manner. The drain which receives the refuse and slops from the kitchens and dispensary is carried about twelve feet outside the main building where it is allowed to enter the ground. Since the commencement of this report, a water-closet has been erected in the western ward, which will probably render that room untenable, and the soil-pipe and drain from kitchens and dispensary will now run through a *wooden sewer* and empty into the river just above Seavey's Island bridge. The use of *wooden sewers* cannot be too strongly condemned. Independent of the soil saturation which must result from their use, they are opposed to all principles of sanitary engineering, and in the end are more expensive than if properly constructed of cemented brick or vitrified pipe. The house of the naval constructor, situated at Seavey's Island, is an evidence of the evils of imperfect sewerage. The members of the household have been constantly sick, and diphtheria and other affections have been rife in the family. Fortunately no case has yet proved fatal, but if something is not speedily done to correct the sewerage and drainage, serious results may ensue. The soil-pipe from the water-closet and bath-rooms and the drains from kitchen and scullery now enter a sewer which runs close by the well from which drinking-water is obtained, and then passes in a southwesterly direction about one hundred yards, when it empties into the ground. Around the exit of this sewer is a mass of reeking filth which has collected there and has no means of exit to the river. This pestiferous pool of kitchen slops, decaying vegetable matter, and human excrement scents the air and clogs the exit of the sewer so that its con-

tents and gases only partially escape, and the wonder is that typhoid fever has not carried off some of the inmates of the house. Another accumulation of filth may be found in the stables belonging to the fire department. Here four horses are stabled, and no provision has been made for drainage, although a pipe leading from the water-closet to the main sewer runs within six feet of the stable. The consequence is that through the open slats of the stalls the urine and fluid manure find their way under the stable-floor, and this rotting and stinking collection has to be removed occasionally. The engineer of the fire department and the men on duty are required to sleep in the engine-house, and they are constantly complaining of nausea, headache, and other effects of contaminated air.

There surely cannot be any good reason for such a deplorable state of affairs. The proper sewerage and drainage of the station are of the utmost importance, involving as they do the health and comfort of all government employes. If there be not sufficient money appropriated for this work, a proper representation ought to be made to the Department, the services of a sanitary engineer should be obtained, and the sewerage and drainage of the station should be immediately perfected.

As "prevention is better than cure," and it is ever so much easier to prevent disease than to cure it, I would suggest the appointment of a permanent sanitary board at every navy-yard or naval station. This board should consist of the civil engineer, a medical officer, and a line officer, who should take cognizance of all matters relating to the sanitary affairs of the station. They should make frequent inspections of the houses, workshops, barracks, and public buildings, give particular attention to the sewerage and drainage, and rigidly enforce all hygienic regulations. The result of such inspections should be reported quarterly to the Bureau of Medicine and Surgery, together with such suggestions as may be deemed necessary to preserve the health of the station.



## WATER-SUPPLY.

Though wells had been sunk and cisterns built in various parts of the yard, at a cost of \$31,528, much difficulty was experienced in obtaining a sufficient supply of fresh water. This was especially the case in 1874, when in consequence of the dryness of the season the drought was excessive, and water had to be obtained from the vicinity. As the workshops of the yard are dependent upon the use of fresh water for the boilers, it was proposed to sink an artesian well upon Seavey's Island at a cost of \$60,000, but a less expensive plan was adopted by damming up some springs on the island. Two large ponds were thus formed, and the water is conducted by pipes to cisterns in the yard. The damming back of such a volume of water will saturate the adjacent soil, and as the bottoms of the ponds become filled with decaying vegetable and animal matter, they may in the future prove a fruitful source of malaria. To obviate these evils it would be necessary to remove all vegetation, cleanse the ponds thoroughly, enclose them with walled sides, and thus convert them into reservoirs of pure water. At present the ponds are stocked with fish, and they supply during the winter season several hundred tons of good ice which is stored for the use of the navy-yard, hospital, and quarantine station.

The wells on both islands yield a fair supply of potable water which contains more or less earthy salts, but not enough to make it too hard for general use. The well-water at the marine-barracks is the best on Dennett's Island for drinking purposes. The well in the anchor park has at times an unpleasant taste, and the water quickly decolorizes the test solution of potassa permanganate. The well at the house of the naval constructor contains too much organic matter, and is probably contaminated by the sewer which passes within a few feet of its watershed. The purest water is found in a well situated near the "pest-house." It comes from a granitic soil, and gives less than 9.12

grains of salts containing water of crystallization. The water at the barracks is clear, limpid, of an agreeable taste, and contains on evaporation about 16 grains to the gallon of solid residuum,  $7\frac{1}{2}$  grains of which are combustible organic matter, and the remainder earth and alkaline salts of soda and lime, with a faint trace of iron. A well situated near the "Wise house" on Seavey's Island is badly located, and I have traced stomach irritation and bowel complaint to the use of water from that well, which I believe to be largely impregnated by soil saturation from immense quantities of manure spread over the adjacent land.

Large cisterns were built for special purposes in the navy-yard, some of which are supplied with water from the ponds, while others (like the great cistern in front of the fire department, which contains 200,000 gallons) collect the rain-water from the slate roofs of the public buildings.

#### FIRE DEPARTMENT.

In 1869 a large and handsome engine-house was built, and completed a few years afterwards at a total cost of \$9,400. It contains stabling for four horses, a fine "hose-tower," sundry offices, an engine-room, and every necessary for the use of three powerful steam-engines. The horses are well trained, the engines in good condition, and the fire department so well organized that it would be ready at a few minutes notice to meet any conflagration. In addition to these precautions, the quarters of the officers are furnished with fire-buckets, and there is always a plentiful supply of water for any emergency. Fires are rather uncommon in the navy-yard, but the engines have done admirable service in Portsmouth and its vicinity.

#### GEOLOGY.

The general conformation of both islands is irregular, uneven, and hilly. Seavey's Island would require considerable leveling

and filling in to fit it for use as a navy-yard, but it is not improbable that in course of time the quarters of the officers will be removed to it (as there are a number of excellent building-sites), in order to make room for more important structures on the more level ground of the old navy-yard.

The surface of Seavey's Island is irregular, the strata very much broken, and in some places considerably "weathered." It is covered with a shallow but good soil of diluvium or disintegrated quartz, feldspar, mica, &c., which is well adapted to the raising of potatoes, corn, and vegetables of all kinds. The coast-line here trends northeast and southwest, and this peculiar direction of the strata has probably governed the course of the sea-line of the entire coast of Maine. The granite crops out on the sea edge of the island, but away from the shore-line it changes its mica for hornblende, and hence becomes syenitic. This would make a fair building-material for navy-yard purposes. Outcrops of gneiss with layers of hornblende schist are common, and this gneiss would form an excellent building-stone. On the west side of the island there is an obscure gneiss and mica schist; the micaceous rocks being probably connected with the Taconic series.

The potash mica and potash feldspar (*Orthoclase*) are most common in the granite, while in the gneiss both hornblende and epidote prevail. The general dip of the gneiss is southeast, and I fancy this is common throughout the State, but occasionally a northwest dip is seen. The mica schist on these islands passes insensibly into other schists—the talcose and hornblende. Where the mica is deficient it passes into quartzose rock, and where quartz is deficient it runs into a pyritiferous clay slate, which is common along the coast-line. The course of the strata is northeast, and may belong to the Taconic system. Saccharoid Azoic limestone is only occasionally met with, though it is common enough in the southwest of York County, in the gneiss

and mica schist formations. The clay slate is coarse, fissile, easily "weathers," and is almost useless for building purposes. It rests upon the granite and is generally of a dull blue or brownish-red color, with irregular cleavage planes, crossing the planes of deposition at various angles. The granite approaches so near the river that the slate band is extremely narrow, and very little siliceous slate can be found near Kittery.

There are very few minerals. In the mica schists, stauroides and kyanite occur. In the granite rock are small crystals of rose and smoky quartz, lepidolite, albite, and beryl. Iron pyrites and red hematite are less common here than in other parts of the State, as for instance, Aroostook County. I have seen some splendid specimens of the Aroostook ore, which is remarkably fine, and it could readily be worked into "pigs" for transportation. Judging from the analysis of Jackson, there can be little doubt that the Aroostook limonite would yield quite as good a product as the famous Woodstock red hematite, from which the finest English armor-plates have been made, and from which the best results as to resistance have been obtained. It seems strange that we should go on manufacturing armor-plates from scrap-iron (which are readily shattered by modern ordnance) when we have within our reach, and within our own borders, the finest and toughest iron for that purpose, in the world. The present condition of our iron-clads should call attention to this matter, as well as to the rapid deterioration of the iron and loosening of the plates resulting from the imperfect mode of wooden backing. To prevent oxidation from moisture and humic acid is an important point, yet the difficulty may be largely obviated by coating the plates with magnetic black oxide, by a modification of the Barff process, which I had the honor to submit to the department.

The soil on Seavey's Island is generally shallow, except on the small tract known as "Abraham's Farm." Here the boulder-

clay, mixed with disintegrated feldspar, quartz, and mica, forms a pretty deep alluvial deposit, which has been much improved by a liberal use of sea-weed. The *Zostera marina*, or eel-grass is thrown ashore here and along the coast in large quantities, but as a manure it is inferior in value to the *Laminaria digitata* or the fuci (*Nodosus* and *Vesiculosus*), which are quite common. All of these sea-weeds contain a large proportion of mineral constituents, and yield from 15 to 30 per cent. of ash, the amount varying, of course, with the species used, its maturity, stage of growth, and locality. This ash is rich in alkaline salts, including phosphate of lime, which makes it (either alone or in combination with bone-phosphates and sulphur or other manure) an excellent general fertilizer.

There is a very large deposit on the flats along the coast which is something like the French "tangué." It is known here as "muscle-bed," and is a mixture of mud, ooze, shell-fish, and silicates. This has been found by farmers to be a valuable and permanent fertilizer for the clayey loams near the sea-coast.

A considerable portion of the land is arable, and at one time was a source of considerable profit to the islanders. The grass on the island is of excellent quality, and yields a large crop of succulent hay.

Both islands are well timbered, and many ornamental trees have been planted in front of the officers' quarters. In the grounds of the commandant's residence stands a magnificent tree known as the "old elm." It measures 26 feet in circumference by 90 feet in height.

Besides elms, there are horse-chestnuts, swamp-willows, maples, beeches, small pines, and junipers (*Larix Americana*), lilacs, mountain-ash (*Sorbus Americana*), and the *Populus candicans* or balm of gilead. In the officers' gardens are apple, pear, and plum trees, and on Seavey's Island are two or three apple orchards and a number of cherry-trees (*Prunus cerasus*, *Cerasus*

*avium*). Currants, strawberries, and raspberries are cultivated in the officers' gardens, and the *Rubus trivialis*, *Rubus strigosus*, *Vaccinium corymbosum* grow wild on the islands. Among the plants may be noticed the tansy, *Tanacetum balsamita* or *Hortense* (*T. Huronense* is not to be found in Maine south of Seven Isles), the plantain (*Plantago Virginica*), milk-weeds (*Asclepias cornuti* and *incarnata*), mullein (*Verbascum simplex*), white everlasting, burdock (*Arctium majus*), dandelion, catnip, spearmint, the edible lamb's-quarter or pig-weed (*Chenopodium album*), *Artemisia caudata*, *Selaginella opus* (found in the lower meadows), *Atragene viola*, *Pulustris-pedata*, the *Mertensia maritima* and *Claytonia*. Many rocks are covered with the common lichens *Cladonia* and *Lecidea*. There are several species of algæ in the adjacent waters, *Sagittaria variabilis*, including two well-marked varieties, *S. heterophylla*, or a form very much like it. In stagnant pools near the ponds are found the *Scirpus palustris* and cat's-tail (*Typha latifolia*). Shell-fish are to be had in abundance, lobsters (*Astacus Americanus*), crabs, clams, muscles (*Mytilus borealis*), and others. Some of the most inveterate forms of urticaria I have ever met with were caused by eating muscles, and attacks are quite common among visitors who indulge in this luxury(?). Fish are also plentiful. Yellow or brindle perch (*Perca flavescens*), spring and fall mackerel, bluefish, porgy (*Pagrus argyrops*), cunners (*Ctenolabrus*), rock or striped bass, flounder (*Pleuronectes Americanus*?), eels, weakfish or squeteague, and alewives (*Alosa tyrannus*). Both varieties of the cod (*Gadus Americanus*, *pruinus*), pollock, hake, and cusk (*Brosimius flavescens*) are caught in vast numbers on the coast, and are extensively used for food and for the manufacture of cod-liver oil. Large quantities of the latter are made in Portsmouth by Messrs. Marvin & Co., and the oil is probably the product of the livers of all fish allied to the cod. The oil is of a pale, transparent yellow color, sp. gr. about 0.920, is

very pure, and free from disagreeable taste, but is not, I think, as efficacious as the finer varieties of the Norwegian oil.

Snakes are quite common on Seavey's Island, but they are perfectly harmless. The *Eutania sirtalis* and *saurita* (striped and riband snakes), the little brown snake (*Storeria DeKayi*), and the pretty little green snake (*Chlorosoma vernalis*). The black snake (*Bascanium constrictor*) is said to exist on the island, but I have never seen one, and it is rare even in the southwestern parts of Maine. There are plenty of amphibians, *Rana catesbiana*, *clamitans*, and *palustris*, *Hyla versicolor*, and *Bufo Americanus*. The *Rana clamitans* is now very abundant, although two years ago there was scarcely one to be seen. It is not the young of the *Rana catesbiana*, as has been suggested, for it has specific marks of difference in the ruffle or fold of skin which grows behind the eye, extending upward and backward, forming a side or rather dorsal fold; besides, it has a much larger tympanum than its supposed progenitor.

In the neighborhood of the ponds one is troubled with clouds of midges (*Simulium nocivum*), but mosquitoes are not so common. The great pest of this station is the bed-bug (*Cimex lectularius*), which infests the hospital and the officers' quarters, despite the utmost care and cleanliness, the use of sulphur fumigations, and the liberal use of chinch poison. Probably the only effectual remedy would be to dispose of the very old furniture with which nearly all the quarters are furnished, to fumigate the rooms thoroughly with sulphur, fill up the cracks in the wood-work, and then repaint the insides of all the houses. Cockroaches and croton-bugs are found in all the houses, but although they are considered the natural enemy of the bed-bug, they appear to make very little impression upon that nocturnal marauder. For the past three years the potato-bug (*Doryphora decem-lineata*) has been very destructive to the potatoes and egg-plants, which form its favorite food. Various experiments have

been tried to get rid of this pest, but none have proved more effectual than the mixture of Paris-green and gypsum. Soot, wood-ashes, sal-ammoniac, and carbolic-soap suds have been used with no better success. Early in the morning the insects while torpid, and the larvæ, may easily be detached from the leaf by shaking them into a pan of water, and in this way they may be kept from doing much damage. Eternal vigilance is, however, necessary to destroy this voracious pest, which flies from place to place, swims rivers, creeps over bridges, wharves, fences, houses, travels on every kind of conveyance, and against which all the efforts of the farmer and chemist have proved fruitless.

The birds that most frequent the islands are the robin (*Turdus migratorius*), swallow (*Hirundo viridis*), martin, humming-bird (*Trochilus colubris*), yellow-bird (*Fringilla tristis*), bobolink, wood-pecker, sparrow (*Spizella monticola-socialis*), pewee, and oriole.

The muskrat (*Fiber zibethicus*) was formerly quite common in this locality, but is now becoming scarce. The common brown rat (*Mus decumanus*) overruns some of the quarters, and is very destructive to young chickens. The skunk (*Mephitis mephitica*) frequents both islands, and occasionally visits the officers' quarters, heralding its presence by an odor disgusting to most olfactories.

#### CLIMATOLOGY.

The climate of the islands and surrounding country is considered salubrious, and so conducive to longevity that a greater number of aged people are said to be found here than in any other part of New England. The winters are long and severe, lasting usually from November to April, and are very trying to persons suffering from rheumatism, neuralgia, and bronchial affections.

The summers are short and generally mild, with an occa-



sional hot spell in July and August. The prevailing winds are northerly, but southwest and westerly winds are common. The east wind is less prevalent here than at Boston, and is less piercing and chilly, though fires are sometimes necessary in summer when the wind is in that direction. The thermometer ranges from 90° above to 15° below zero, falling in the interior of the State to 20° and even 30° below. The annual mean may be considered 44° Fah., and the greatest monthly range about 85° Fah. The warmest day generally occurs in July or August, and the coldest in February. The monthly fall of rain rarely exceeds 6 inches, and of snow 42 inches. The barometrical mean, taken for four months (observed height) is 29.88; the range from 0.67 to 1.17 inches. But little dependence, however, can be placed in "means" and "isothermal lines" based upon mean temperatures. They do not give a correct idea of the vicissitudes of climate. It is the *range* of the temperature, and moisture between extremes from midwinter to midsummer, the *range* between the extremes from one day to the next, and the *range* between the different hours of the same day, that is after all the best index of a climate and its effects upon bodily health. A meteorological record has never been kept with any regularity at this station until within the past six months, but now, under the systematic regulations of the Signal Office, the record will become valuable, not only to the meteorologist, but also to the physician. Storms are not uncommon along the coast, and the force of the wind has been sufficient to unroof buildings in the navy-yard. Fogs are not infrequent during the spring and early summer months, but they do not last long at any time.

#### DISEASES.

Owing to the general coldness and humidity of the atmosphere and variability of the climate, the prevailing diseases at this station are pulmonary and rheumatic affections. Catarrh,

bronchitis, pharyngitis, pleuritis, pneumonia, phthisis, rheumatism, and neuralgia, occur amongst the marines, and in most cases may be traced to the ill-ventilated and badly heated barracks, or to exposure on post. Syphilis, gonorrhœa, and chancre are not very common among the troops, and are usually of a mild character, very amenable to treatment. Recruits and men transferred here from other stations are apt to be troubled for a few days with diarrhœa, which I have usually attributed to change of water or indulgence in unripe fruit or shell-fish. *Urticaria* is common from the use of lobsters and muscles, and is sometimes very difficult to cure. Rheumatism is usually the result of exposure, neglect to change damp clothing, or of the humidity of the guard-room, which used to be washed too frequently. Scarlet fever and diphtheria found their way into the yard last winter, but being of a mild type did not extend beyond two families. Diphtheria, however, is not uncommon in Portsmouth and Kittery, and is, probably, the result of sewer-gas or foul ground-air. The sewerage and drainage of both towns are simply abominable, and the people, however intelligent they may be in other respects, are grossly ignorant of sanitary matters. Nothing but a fatal result will open the eyes of a householder to the evils by which he is surrounded, and it is hard to convince him that the proximity of his well to his cess-pool (common enough throughout New England) has been the cause of the typhoid fever or diphtheria which has swept off his wife or children. Still less can he understand the evils of ground-air, and its intimate relations with the interior of his house, his drains, his gas-pipes, and privies. He heats his house in winter like a Russian, little aware of the fact that the air in the ground is set in motion by pressure of the external wind on its surface, and by the diffusion and difference in temperature between the inside and outside of his dwelling. It is not until some member of his family is stricken down by dis-

ease, poisoned by the insidious ground-air and foul gases carried into the current of circulation by the heat of the house, that he becomes aware of the necessity of free ventilation, proper sewerage, drainage, and cleanliness.

To these causes are unquestionably due much of the diphtheria and typhoid fever so common in the country and adjacent towns. Many cases of diphtheria (so called in this part of the State) are really only cases of membranous croup, tonsillitis, or mild forms of the old-fashioned ulcerated sore-throat. It is fashionable, however, to call all such affections *diphtheria*, especially as a cure under that name will reflect infinitely more credit upon the practitioner. Still, cases of the genuine disease, with enlarged lymphatics, foetid breath, ash-gray, parchment-like membrane, &c., are not unfrequently met with, and the treatment that has proved most successful here has been to support the system from the outset, and use chlorate of potassa and tincture of chloride of iron, locally and internally. I have had some success with Lugol's solution of iodine, used as a wash for the membranous patches, and internally in five to ten drop doses in sweetened water.

Typhoid fever (and a typhoidal type of nearly all diseases) is common in Portsmouth, and is doubtless due to the imperfect drainage and sewerage of the houses and hotels, and the deleterious emanations from the mill-ponds into which the refuse from two or three large breweries and nearly all the sewage of the city empty. Certainly the present condition of affairs cannot last long without producing serious results, and I understand that the health authorities of Portsmouth are about to remedy these evils.

As might be expected from the humidity of the climate, the ground-moisture and consequent humidity of dwellings, imperfect ventilation, overheating with cast-iron stoves, and vitiated air resulting therefrom, phthisis is by no means uncommon. It

is generally due to the above causes, and is immediately dependent upon lymphoid deposits resulting from croupal, catarrhal, and chronic pneumonias. In the navy-yard hospital there is a strong tendency in pulmonary affections to terminate in phthisis, which in many cases has resulted fatally. I can only attribute this fact to the pestiferous atmosphere of the wards, which, after forty years of continuous use, are contaminated with decaying organic matter, epithelium, pus-cells, and germs of monads and bacteria. In these wards the plastering, wall-paper, and wood-work must be saturated with organic matter, which mere ventilation and cleanliness will not remove. Tyndall has drawn attention to this matter and proved conclusively that most of the evils of "*hospitalism*" arise from these atmospheric impurities. Dallinger, in some recent experiments upon the calycine and springing monads shows the rate at which these minute organisms fall through the air, and the time after the expiration of which putrescible fluids in a still atmosphere are out of danger from their contact. He has proved that whenever a putrid infusion dries up, there will be found a powdery mass containing spores which every breath of air will diffuse far and wide, and that some of these spores are so minute as to require two days to fall a few inches in a perfectly still atmosphere; so that the distance to which they could be carried, and to which they could spread contagion is practically unlimited.

One form of monad, the "*uniflagellate*, in its adult state" is about  $\frac{1}{1500}$  of an inch in length, and its spores are so minute as actually to be invisible with the highest powers of the microscope." (*Vide* Microscopical Journal, December, 1876.) Bearing these facts in mind, one need not wonder at the tedious convalescence of patients in the wards of the sick-quarters of the Portsmouth yard, nor be surprised at the fatality among comparatively mild cases. Under the best of circumstances phthisis runs a remarkably rapid course in this climate. If we assume the aver-

age or mean duration of that disease to be two or three years, it generally proved fatal (in cases coming under my notice) within a year. Maine is therefore not a desirable residence for tuberculous or other pulmonary affections, and it is particularly injurious to those subject to hemorrhages. I have known persons who had not suffered from the latter for many years to have spitting of blood after a few weeks' residence on these islands, and this would recur on every visit, though the patient was quite free from hæmoptysis at home. In another case, a lady from Philadelphia who had been free from hemorrhage for over sixteen years, had frequent attacks of hæmoptysis after residing here a few months. Her circulatory system eventually accommodated itself to the climate, and the hemorrhages gradually ceased. I believe that much of what we call disease is simply an effort on the part of the system to accommodate itself to its surroundings. Herbert Spencer defines life "as the continuous adjustment of internal relations to external relations." The same definition may be applied to health. I have noticed that many persons from the South and West sojourning here rarely feel well for the first two or three weeks after their arrival. They must undergo acclimation. They usually complain of languor, indifference to exertion, hebetude of mind, weakness of the extremities, a sense of oppression over the chest, functional heart affection, a quick pulse, short breath, headache, &c., in short very many symptoms of *mal de montagne* or mountain-sickness. Some complain of vertigo, dimness of sight, and a sensation of sea-sickness, or a feeling as if they had just landed from a steamer and had not yet recovered their land-legs. De Saussure's theory would account for these symptoms by an insufficient absorption of oxygen, an *anoxÿhamia*, the result of *diminished* atmospheric pressure. It is not, however, the mere lowering of mechanical pressure which causes these symptoms, but the low tension of the oxygen which prevents it entering the blood in a sufficient quantity as the

pressure of the atmosphere diminishes; the amount of oxygen is lessened, and in consequence we find the arterial circulation and respiration increased, and there is more or less muscular and nervous debility. Menstrual irregularities are very common here. Females who have been regular in other parts of the country, after their removal to this place suffer from suppression, and gradually incline to obesity. On the other hand, cases of menorrhagia are aggravated and obstinately resist treatment. Sea-bathing will sometimes effect a cure when medication fails. The women in this part of the country rarely bathe in the sea on account of its producing menstrual suppression; but I fancy there is another reason—the water is too cold.

Neuralgia prevails here and assumes all imaginable forms. Females are more subject to attacks than males, and it appears to be dependent in a large number of cases upon *anæmia*. Cephalalgia, intercostal and trifacial neuralgias are most common, and the headaches are often of the most intractable kind. The second branch of the fifth nerve is frequently affected, creating intense agony in the temples and forehead and in the ball of the eye, causing increased lachrymation. In this form I have found great relief from sponging the painful parts with a sponge wrung out in scalding water and applied as hot as the patient could bear it. In this way I have been able to chase away the pain from one part to another until it disappeared. The torment may sometimes be relieved by the application of a Petit's tourniquet to the head, placing the pad over the forehead with a small fold of lint beneath. In this way the pressure may be made gradual and in accordance with the feelings of the patient. Arsenic, quinia, iron, gelsemium, and other vaunted remedies have been used with varying success, and in malarial cases arsenic has proved particularly useful. In intercostal neuralgia, and in some cases of sciatica, I have derived immediate

benefit from hypodermic injections of *hot* water over the affected point. The relief was sometimes instantaneous, in others it was only temporary.

In acute rheumatism, salicylic acid and salicin have been faithfully tried, but I am not satisfied of their specific action on that disease; and I have had equally good results from aconite quinia, arnica, and iodide of potassium.

In pulmonary disorders I have resorted largely to the use of inhalations, using the vapor of copaiba, conium, carbolic acid, muriate of ammonia, &c., with some success. A satisfactory form of inhaler has yet to be devised, as none of those at present in use meet all the requirements. When such an instrument is invented, inhalation will probably be found the most satisfactory and rational mode of treating bronchial affections.

Medical practice in Portsmouth, N. H., and adjacent towns in Maine, is in a transition state. Many practitioners are wedded to old and effete rules of practice, and have but little sympathy with new-fangled notions. There are, however, some excellent town and country practitioners, whose large field of experience, good judgment, and keen observation more than compensate for a slim knowledge of the refinements of modern medicine.

I regret that I am unable to obtain from the health board reliable statistics of diseases or mortality, and judging by the loose way in which such matters are attended to in the city of Portsmouth, I question if any tables drawn from that source would be of any practical value. The board of health of that city is composed of one physician and two or more politicians. There is no register of vital statistics, and a registration or certificate of a birth or death is not required. Inquests are held at the option of the mayor. In a case of murder or suicide the coroner may recommend an inquest, but unless the case is one of extraordinary interest, sufficient to justify the outlay of a few

dollars, a medical examination will not be allowed by the mayor. In this way, murderers may go unwhipped by justice, and the wonder is that crime is not more common. But little interest is manifested in sanitary matters by citizens or the municipal authorities. They do not recognize that disease is preventable, and are not only ignorant of the evils around them, but they are actually indifferent to the conditions that deteriorate health. It will take years to educate these people to a full appreciation of the necessities of hygiene, and civic cleanliness can scarcely be hoped for until an enlightened and intelligent city corporation take the matter earnestly in hand. The continued presence in their midst of typhoid fever and diphtheria is opening their eyes to the necessity of properly sewerage the city, draining their mill-ponds, and looking sharply after their wells, but these evils must be explained, and the relation between cause and effect must be conclusively shown before we can expect any great reform. To do this effectually, doctors must become sanitary teachers in every community.

There are quite a number of regular practitioners in Portsmouth who have a fair share of practice, but as there is no public hospital or dispensary, the poor, as usual, receive a large share of their services gratuitously. The tone of the profession is scarcely up to the standard, but county medical societies and a State board of health will tend to elevate it, professionally. Much, of course, will depend upon the medical men, but a great deal will depend upon the laity. At present the latter have but little appreciation of the profession, and look upon physicians as a necessary evil. They do not seem to recognize the difference between a profession and a trade, and consider a medical mountebank, a legalized quack, or a vendor of patent medicine, as the equal of the physician. How can it be otherwise when no examination or legal proof of



a degree in medicine is required ? Where there is no official recognition of the high and important calling of a physician, and no legal protection for the sick, charlatanism must flourish, imposters fatten on their victims, and quacks acquire experience at the expense of the lives of our best citizens. But this is a free country, and if every man is not his own doctor, every man may be, so far as Maine and New Hampshire are concerned. Here disease is still regarded as a divine visitation, yet there is a wonderfully abiding faith in the virtues of patent and domestic remedies. Druggists, dentists, nurses, and quacks of all kinds, hydropaths, oleopaths (a new sect of oil-rubbers), eclectic, homœopaths, and that despicable compound of knavery and ignorance, the advanced or modern Hahnemanian, who under the guise of homœopathy practises any-pathy, are all here dubbed "doctor." We are surely living once more in the "unlicensed laity phase" of Rome, and *time* and a bitter experience of the evils of empiricism and bare-faced charlatanry will alone work a change in the public mind. Meanwhile the regular profession of medicine must be content with a modicum of gratitude and respect, continuing to labor zealously in the great work of humanity by lifting the burdens of disease from the wretched, and putting away the ills that darken the world and curse the human race.



# STATISTICS RELATING TO THE HEALTH OF THE NAVY.

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REPORTED BY THOMAS J. TURNER, M. D.,  
MEDICAL INSPECTOR U. S. NAVY.

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I have to present for consideration the following statistical account of the health of the Navy since the year 1850.

It must be premised, however, that under the headings of "Cases treated" are grouped the most trivial as well as the most grave of casualties, for the reason that the very nature of a military organization demands the cognizance of disease which in civil life would pass unnoticed.

The accompanying tables explain themselves and are believed to furnish all the data necessary for determining the average general health of the various stations.

A table of the death-rates per mille of the four most frequently occurring classes of disease is added. In this table it will be noticed that the death-rate of diseases of the circulatory system stands prominent. How far this rate has been increased since the introduction of steam as a motor in ships of war I am at present unable to state. Certain indications have led me to suggest this cause as a part of the etiology of this class of diseases. The ordinary sequences of maladies produced by humidity and varying temperature must be added as the other factors in the production of diseases of the circulatory apparatus.

Beyond this suggestion no attempt has been made to define the influences that determine either rates of sickness or mortality.

It will be observed also that the ratios of sickness and the ratios of mortality have very little apparent relation with each other, and a high rate of mortality does not presuppose a high rate of sickness.

Again, it has not been considered of use to endeavor to establish the exact relations between mercantile marine mortality and civil or even Army mortality. The subject of the health of the Navy demands a knowledge of the various stations upon which sailors are employed, the size and rate of the vessels, their different construction, their complement, their duties, and the discipline of men who represent in a certain degree assured lives before any decided relations can be determined between the different rates of mortality mentioned. Since 1864 the ratios have been calculated from the aggregate number of men employed at sea. The ratio per mille of the average force of Her Britannic Majesty's navy for thirteen years, *i. e.*, from 1856 to 1869, of sick from disease or injury was 1421.9, and the death-rate per mille was 14.3.

A table showing the total cases of disease and injury, deaths, and the aggregate force employed for thirteen years, *i. e.*, from 1864 to 1876, with the sick and death rates per mille in our own service, has also been added.

# STATISTICS RELATING TO HEALTH OF THE NAVY. 965

## STATISTICS RELATING TO THE HEALTH OF THE NAVY.

Table showing as nearly as possible the average strength of the Navy, including officers, men, &c., with total number of deaths for each year from 1850 to 1866, inclusive.

[This table includes all sea as well as shore stations.]

Year.	Average strength.	Deaths.	Death-rate per mille.
1850.....	9,087	129	14+
1851.....	9,063	85	9+
1852.....	9,103	81	8+
1853.....	9,051	84	9+
1854.....	8,975	193	21+
1855.....	8,972	115	12+
1856.....	9,962	119	11+
1857.....	10,163	125	12+
1858.....	11,895	155	13+
1859.....	11,895	115	9+
1860.....	11,000	121	11
1861.....	20,000	178	8+
1862.....	25,905	575	22+
1863.....	40,000	1,048	26+
1864.....	43,787	1,373	31+
1865.....	52,641	890	28+
1866.....	17,193	310	18+

For the year ending December 31, 1864.

Stations.	Aggregate number of men.	Cases treated.	Deaths.	Sick-rate per mille.	Death-rate per mille.
North Atlantic.....	10,995	13,263	132	1,206+	12+
South Atlantic.....	6,735	1,389	84	206+	12+
East Gulf.....	2,190	2,695	32	1,189+	14+
West Gulf.....	6,968	8,561	137	1,216+	19+
Mississippi.....	6,569	14,235	354	2,166+	53+
Pacific.....	1,304	2,127	23	1,631+	17+
Potomac.....	1,212	1,117	11	921+	9+
Special service.....	3,771	3,648	29	967+	7+
Total.....	39,744	52,945	802	1,332+	20+

Diseases.	Cases treated.	Deaths.	Death-rate per mille of cases.
Febrile diseases.....	13,329	202	15+
Digestive system.....	12,115	117	9+
Respiratory system.....	6,850	215	31+
Circulatory system.....	685	21	30+
Nervous system.....	1,370	30	21+
Cellular and cutaneous system.....	4,097	4	0.9
Fibrous system.....	2,966	5	1+
Serous system.....	148	5	33+
Genito-urinary system.....	3,071	2	0.6
Malignant.....	1,078	9	8+
Eye and ear.....	940	1	1+
Wounds and injuries.....	5,094	191	37+

966 STATISTICS RELATING TO HEALTH OF THE NAVY.

*For the year ending December 31, 1865.*

Stations.	Aggregate number of men.	Cases treated.	Deaths.	Sick-rate per mille.	Death-rate per mille.
Atlantic.....	9, 512	10, 427	168	1, 096+	17+
Gulf.....	6, 775	8, 844	75	1, 305+	11+
Mississippi.....	4, 033	8, 630	167	2, 139+	41+
Potomac flotilla.....	533	988	1	1, 853+	1+
Pacific.....	1, 980	2, 099	12	1, 060+	6+
East Indies.....	750	922	7	1, 229+	9+
West Indies.....	95	115	4	1, 210+	42+
Brazil.....	855	1, 010	6	1, 181+	7+
European.....	698	647	14	927+	20+
Special service.....	3, 024	2, 937	19	971+	6+
Coast Survey.....	40	54	0	1, 350	0
Iron-clads, ordinary.....	117	297	2	2, 538+	17+
School and practice ships.....	968	1, 106	5	1, 142+	5+
Total.....	29, 400	38, 076	480	1, 291+	16+

Diseases.	Cases treated.	Deaths.	Death-rate per mille of cases.
Febrile diseases.....	9, 214	146	15+
Digestive system.....	7, 818	50	6+
Respiratory system.....	6, 034	134	22+
Circulatory system.....	511	9	17+
Nervous system.....	953	18	18+
Cellular and cutaneous system.....	2, 720	0	0
Fibrous system.....	2, 804	5	1+
Serous system.....	98	3	30+
Genito-urinary system.....	2, 527	3	1+
Malignant.....	659	9	13+
Eye and ear.....	709	0	0
Wounds and injuries.....	4, 029	103	25+

*For the year ending December 31, 1866.*

Stations.	Aggregate number of men.	Cases treated.	Deaths.	Sick-rate per mille.	Death-rate per mille.
North Atlantic.....	2, 423	2, 546	36	1, 050+	14+
Gulf.....	1, 352	1, 908	23	1, 411+	17+
South Atlantic.....	1, 404	1, 200	16	854+	11+
European.....	1, 935	1, 545	27	797+	13+
North Pacific.....	2, 249	1, 707	16	754+	7+
South Pacific.....	1, 173	891	7	759+	5+
Asiatic.....	1, 407	2, 539	28	1, 804+	19+
Special service.....	1, 593	1, 265	18	794+	11+
School and practice ships.....	1, 433	2, 229	7	1, 625+	4+
Coast Survey.....	139	91	1	654+	7+
Total.....	15, 108	15, 921	179	1, 053+	11+

# STATISTICS RELATING TO HEALTH OF THE NAVY. 967

For the year ending December 31, 1866—Continued.

Diseases.	Cases treated.	Deaths.	Death-rate per mille of cases.
Febrile diseases .....	3,339	65	19+
Digestive system .....	3,415	40	11+
Respiratory system .....	1,746	37	21+
Circulatory system .....	150	7	46+
Nervous system .....	475	9	18+
Cutaneous and cellular system .....	1,643	2	1+
Fibrous system .....	1,201	0	—
Serous system .....	32	1	31+
Genito-urinary system .....	1,502	2	1+
Malignant .....	232	1	4+
Eye and ear .....	334	0	0
Wounds and injuries .....	1,852	15	8+

For the year ending December 31, 1867.

Stations.	Aggregate number of men.	Cases treated.	Deaths.	Sick-rate per mille.	Death-rate per mille.
North Atlantic .....	2,571	3,637	100	1,414+	38+
South Atlantic .....	947	1,179	14	1,244+	14+
European .....	1,502	1,214	8	808+	5+
North Pacific .....	1,794	1,550	50	863+	27+
South Pacific .....	1,007	799	12	783+	11+
Asiatic .....	1,397	2,204	13	1,577+	9+
Special service .....	669	771	6	1,152+	8+
School and practice ships .....	931	851	0	914+	0
Coast Survey .....	44	26	3	590+	68+
Total .....	10,862	12,231	206	1,126+	18+

Diseases.	Cases treated.	Deaths.	Death-rate per mille of cases.
Febrile diseases .....	2,908	130	46+
Digestive system .....	2,064	13	6+
Respiratory system .....	1,173	27	23+
Circulatory system .....	105	5	47+
Nervous system .....	413	7	16+
Cutaneous and cellular system .....	1,486	0	0
Fibrous system .....	859	2	2+
Serous system .....	25	2	80—
Genito-urinary system .....	1,302	0	0
Malignant .....	195	1	5+
Eye and ear .....	247	1	4+
Wounds and injuries .....	1,574	18	11+

968 STATISTICS RELATING TO HEALTH OF THE NAVY.

*For the year ending December 31, 1868.*

Stations.	Aggregate number of men.	Cases treated.	Deaths.	Sick-rate per mille.	Death-rate per mille.
North Atlantic .....	2,200	1,896	21	861+	9+
South Atlantic .....	1,223	1,160	3	948+	2+
European .....	1,491	1,791	10	530+	6+
North Pacific .....	1,787	1,467	17	820+	9+
South Pacific .....	1,250	1,063	13	850+	10+
Asiatic .....	2,746	3,051	37	1,107	13+
Special service .....	1,742	227	3	274	3+
School and practice ships .....	1,742	749	2	429	1+
Coast Survey .....	45	46	0	1,022	0
Total .....	13,310	10,450	106	780+	7+

Diseases.	Cases treated.	Deaths.	Death-rate per mille of cases.
Febrile diseases .....	1,768	44	24+
Digestive system .....	1,912	9	4+
Respiratory system .....	1,021	34	33+
Circulatory system .....	105	4	38+
Nervous system .....	407	6	14+
Cutaneous and cellular system .....	1,250	0	0
Fibrous system .....	870	1	1+
Serous system .....	7	0	0
Genito-urinary system .....	1,209	0	0
Malignant .....	114	0	0
Eye and ear .....	210	0	0
Wounds and injuries .....	1,577	8	5+

*For the year ending December 31, 1869.*

Stations.	Aggregate number of men.	Cases treated.	Deaths.	Sick-rate per mille.	Death-rate per mille.
North Atlantic .....	2,792	2,020	14	723+	4+
South Atlantic .....	1,547	1,104	13	713+	8+
European .....	2,279	1,457	11	639+	4+
Pacific .....	1,749	936	11	535+	6+
Asiatic .....	1,989	1,922	9	968+	4+
Special service .....	350	194	1	540+	2+
School and practice ships .....	1,437	611	5	425+	3+
Coast Survey .....	49	81	0	1,653+	0
Total .....	12,201	8,325	64	682+	5+

Diseases.	Cases treated.	Deaths.	Death-rate per mille of cases.
Febrile diseases .....	1,300	22	16+
Digestive system .....	1,448	7	4+
Respiratory system .....	941	20	2+
Circulatory system .....	104	3	28+
Nervous system .....	295	6	20
Cutaneous and cellular system .....	912	0	0
Fibrous system .....	707	1	1+
Serous system .....	17	0	0
Genito-urinary system .....	1,028	0	0
Malignant .....	103	0	0
Eye and ear .....	147	0	0
Wounds and injuries .....	1,323	5	3+



# STATISTICS RELATING TO HEALTH OF THE NAVY. 969

For the year ending December 31, 1870.

Stations.	Aggregate number of men.	Cases treated.	Deaths.	Sick-rate per mille.	Death-rate per mille.
North Atlantic .....	1,731	1,774	7	1,024+	4+
South Atlantic .....	875	1,185	5	1,331+	5+
European .....	2,627	1,449	10	551+	3+
Pacific .....	1,694	1,776	9	1,048+	5+
Asiatic .....	2,278	1,755	10	770+	4+
Special service .....	1,331	891	11	669+	8+
School and practice ships .....	176	63	0	357+	0
Coast Survey .....	48	31	0	645+	0
Total .....	10,760	8,904	52	827+	4+

Diseases.	Cases treated.	Deaths.	Death-rate per mille of cases.
Febrile diseases .....	1,229	10+	10+
Digestive system .....	1,226	4+	4+
Respiratory system .....	954	11+	13+
Circulatory system .....	99	2	20+
Nervous system .....	403	3+	14+
Cutaneous and cellular system .....	1,127	0	0
Fibrous system .....	810	0	0
Serous system .....	25	0	0
Genito-urinary system .....	922	1	1
Malignant .....	140	0	0
Eye and ear .....	192	0	0
Wounds and injuries .....	1,677	11	6+

For the year ending December 31, 1871.

Stations.	Aggregate number of men.	Cases treated.	Deaths.	Sick-rate per mille.	Death-rate per mille.
North Atlantic .....	1,416	1,782	8	1,258+	5+
South Atlantic .....	904	994	7	1,099+	7+
European .....	2,804	2,727	26	972+	9+
Pacific .....	1,930	2,305	10	1,109+	5+
Asiatic .....	1,581	1,433	19	935+	12+
Special service .....	1,653	646	8	390+	4+
School and practice ships .....	480	189	3	393+	6+
Coast Survey .....	45	42	0	933+	0
Total .....	10,763	10,118	81	940+	7+

Diseases.	Cases treated.	Deaths.	Death-rate per mille of cases.
Febrile diseases .....	1,456	13	8+
Digestive system .....	1,637	9	5+
Respiratory system .....	962	17	17+
Circulatory system .....	126	4	31+
Nervous system .....	461	9	19+
Cutaneous and cellular system .....	1,093	2	1+
Fibrous system .....	828	0	0
Serous system .....	23	1	43+
Genito-urinary system .....	1,028	3	2
Malignant .....	167	0	0
Eye and ear .....	206	0	0
Wounds and injuries .....	1,748	23	13+

# 970 STATISTICS RELATING TO HEALTH OF THE NAVY.

*For the year ending December 31, 1872.*

Stations.	Aggregate number of men.	Cases treated.	Deaths.	Sick-rate per mille.	Death-rate per mille.
North Atlantic .....	2, 211	1, 792	19	810 +	8 +
South Atlantic .....	1, 054	955	4	906 +	3 +
European .....	2, 252	1, 603	15	711 +	6 +
Pacific .....	2, 544	2, 910	10	1, 143 +	3 +
Asiatic .....	2, 600	1, 856	12	713 +	4 +
Special service .....	608	466	1	766 +	1 +
School and practice ships .....	202	143	0	707 +	0
Coast Survey .....	99	202	0	2, 040 +	0
Total .....	11, 570	9, 207	61	795 +	5 +

Diseases.	Cases treated.	Deaths.	Death-rate per mille of cases.
Febrile diseases .....	1, 195	12	10 +
Digestive system .....	1, 472	9	6 +
Respiratory system .....	1, 020	18	17 +
Circulatory system .....	185	6	36 +
Nervous system .....	440	4	9 +
Cutaneous and cellular system .....	1, 092	1	9 +
Fibrous system .....	820	3	3 +
Serous system .....	16	1	62 +
Genito-urinary system .....	1, 112	0	0
Malignant .....	109	1	9 +
Eye and ear .....	171	0	0
Wounds and injuries .....	1, 595	6	3 +

*For the year ending December 31, 1873.*

Stations.	Aggregate number of men.	Cases treated.	Deaths.	Sick-rate per mille.	Death-rate per mille.
North Atlantic .....	3, 794	2, 065	10	544 +	2 +
South Atlantic .....	824	767	5	930 +	6 +
European .....	1, 971	1, 281	14	649 +	7 +
Pacific .....	2, 154	1, 866	11	866 +	5 +
Asiatic .....	2, 389	1, 972	11	825 +	4 +
Special service .....	1, 384	784	4	566 +	2 +
School and practice ships .....	175	74	0	422 +	0
Coast Survey .....	32	19	0	563 +	0
Total .....	12, 723	8, 823	55	693 +	4 +

# STATISTICS RELATING TO HEALTH OF THE NAVY. 971

For the year ending December 31, 1873—Continued.

Diseases.	Cases treated.	Deaths.	Death-rate per mille of cases.
Miasmatic.....	1,205	12	9+
Enthetic.....	822	2	2+
Dietic.....	85	3	35+
Diathetic.....	752	0	0
Developmental.....	2	0	0
Tubercular.....	18	0	0
Parasitic.....	13	0	0
Nervous.....	879	7	18+
Eye.....	123	0	0
Ear.....	36	0	0
Teeth.....	3	0	0
Circulatory.....	100	5	50
Respiratory.....	896	10	11+
Digestive.....	1,475	6	4+
Urinary and genital.....	239	0	0
Locomotive.....	52	0	0
Integumentary.....	1,023	0	0
Non-malignant tumors and cysts.....	22	0	0
Wounds, injuries, and accidents.....	1,583	10	6+

For the year ending December 31, 1874.

Stations.	Aggregate number of men.	Cases treated.	Deaths.	Sick-rate per mille.	Death-rate per mille.
North Atlantic.....	6,652	4,213	26	633+	8+
South Atlantic.....	707	531	2	751+	2+
European.....	1,402	996	11	709+	7+
Pacific.....	2,181	1,782	11	817+	5+
Asiatic.....	1,624	1,790	13	1,102+	8+
Special service.....	960	475	1	494+	1+
School and practice ships.....	272	128	0	470+	0
Coast Survey.....	72	81	0	1,123+	0
Total.....	13,870	9,995	64	720+	4+

Diseases.	Cases treated.	Deaths.	Death-rate per mille of cases.
Miasmatic.....	1,384	14	10+
Enthetic.....	719	0	0
Dietic.....	123	1	8+
Diathetic.....	992	3	3+
Developmental.....	8	0	0
Tubercular.....	15	0	0
Parasitic.....	13	0	0
Nervous.....	484	3	6+
Eye.....	156	0	0
Ear.....	55	0	0
Teeth.....	9	0	0
Circulatory.....	97	6	61+
Respiratory.....	1,089	12	11+
Digestive.....	1,717	9	5+
Urinary and genital.....	287	1	3+
Locomotive.....	62	0	0
Integumentary.....	1,068	0	0
Non-malignant tumors and cysts.....	16	0	0
Wounds, injuries, and accidents.....	1,801	15	8+

972 STATISTICS RELATING TO HEALTH OF THE NAVY.

*For the year ending December 31, 1875.*

Stations.	Aggregate number of men.	Cases treated.	Deaths.	Sick-rate per mille.	Death-rate per mille.
North Atlantic.....	3,489	2,400	9	687+	2+
South Atlantic.....	1,124	733	15	652+	13+
European.....	1,182	905	5	765+	4+
Pacific.....	1,782	1,570	9	881+	5+
Asiatic.....	1,489	1,507	8	1,012+	5+
Special service.....	560	329	2	587+	3+
School and practice ships.....	400	251	1	627+	2+
Coast Survey.....	115	137	0	1,191+	0
Total.....	10,141	7,832	49	772+	4+

Diseases.	Cases treated.	Deaths.	Death-rate per mille of cases.
Miasmatic.....	935	14	14+
Enthetic.....	737	1	1+
Dietic.....	97	0	0
Diathetic.....	649	1	1+
Developmental.....	6	0	0
Tubercular.....	15	1	66+
Parasitic.....	13	0	0
Nervous.....	344	4	11+
Eye.....	119	0	0
Ear.....	30	0	0
Teeth.....	6	0	0
Circulatory.....	100	3	30
Respiratory.....	718	11	15+
Digestive.....	1,448	3	2+
Urinary and genital.....	258	1	3+
Locomotive.....	44	0	0
Integumentary.....	828	0	0
Non-malignant tumors and cysts.....	15	0	0
Wounds, injuries, and accidents.....	1,470	10	66+

*For the year ending December 31, 1876.*

Stations.	Aggregate number of men.	Cases treated.	Deaths.	Sick-rate per mille.	Death-rate per mille.
North Atlantic.....	5,920	3,151	11	532+	1+
South Atlantic.....	430	313	3	727+	6+
European.....	1,238	924	7	746+	5+
Pacific.....	1,093	1,144	6	1,046+	5+
Asiatic.....	1,304	1,636	8	1,254+	6+
Special service.....	301	259	4	860+	13+
School and practice ships.....	742	256	2	345+	2+
Coast Survey.....	110	114	0	1,036+	0
Total.....	11,138	7,797	41	700+	3+

# STATISTICS RELATING TO HEALTH OF THE NAVY. 973

For the year ending December 31, 1876—Continued.

Diseases.	Cases treated.	Deaths.	Death-rate per mille of cases.
Miasmatic.....	753	2	2+
Enthetic.....	699	0	0
Dietic.....	153	1	0
Diathectic.....	703	0	0
Developmental.....	6	0	0
Tubercular.....	7	0	0
Parasitic.....	8	0	0
Nervous.....	348	2	5+
Eye.....	117	1	8+
Ear.....	34	0	0
Teeth.....	8	0	0
Circulatory.....	97	2	20+
Respiratory.....	811	10	12+
Digestive.....	1,327	8	6+
Urinary and genital.....	218	1	4+
Locomotive.....	47	0	0
Integumentary.....	915	1	1+
Non-malignant tumors and cysts.....	7	0	0
Wounds, injuries, and accidents.....	1,539	13	8+

Table exhibiting the death-rates per mille of cases of the four most frequently occurring diseases.

Year.	Circulatory.	Respiratory.	Febrile.	Digestive.
1865.....	17+	22+	15+	6+
1866.....	46+	21+	19+	11+
1867.....	47+	23+	46+	6+
1868.....	38+	33+	24+	4+
1869.....	28+	21+	16+	4+
1870.....	20+	11+	8+	3+
1871.....	31+	17+	8+	5+
1872.....	36+	17+	10+	6+
1873.....	50+	11+	9+	4+
1874.....	61+	11+	10+	5+
1875.....	60+	15+	14+	2+
1876.....	20+	12+	2+	6+

# 974 STATISTICS RELATING TO HEALTH OF THE NAVY.

*Table showing the aggregate number of men at sea, the number of cases of disease and injury, and also the deaths for thirteen years.*

Year.	Aggregate force.	Cases of disease and injury.	Deaths.
1864 .....	39,744	52,945	802
1865 .....	29,400	38,076	480
1866 .....	15,108	15,921	179
1867 .....	10,862	12,231	206
1868 .....	13,310	10,450	106
1869 .....	12,201	8,325	64
1870 .....	10,760	8,904	52
1871 .....	10,763	10,118	81
1872 .....	11,570	9,207	61
1873 .....	12,723	8,628	55
1874 .....	13,870	9,985	64
1875 .....	10,141	7,832	49
1876 .....	11,138	7,797	41
Total .....	201,590	190,629	2,250

Sick-rate per mille of force, 945+; death-rate per mille of force, 11+.

## MARINE GUARD QUARTERS AT THE WASHINGTON NAVY-YARD.

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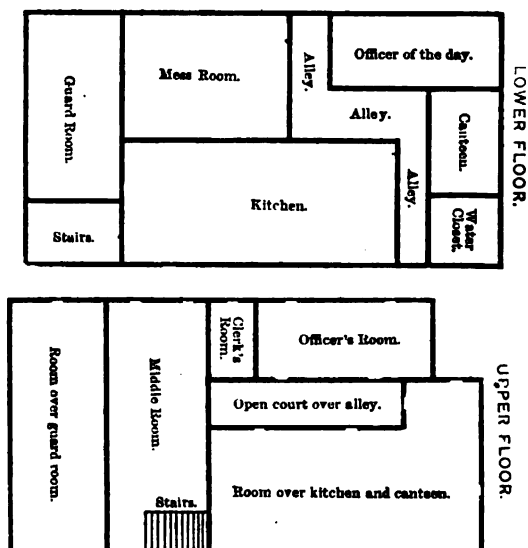
REPORTED BY TALLEYRAND D. MYERS, M. D.,  
PASSED ASSISTANT SURGEON U. S. NAVY.

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In obedience to directions I have made a careful inspection of the "quarters" assigned the marine guard at the navy-yard, Washington, and report as follows :

The force is nearly evenly divided, one-half being quartered in the building west of the navy-yard gate, known as the barracks, the other occupying the room known as the chapel in the old store-house on the east side of the central avenue. The lower floor of the barracks is divided into a guard-room, a mess-room, a room for the officer of the day, a kitchen, canteen, and water-closet. The guard-room, mess-room, and kitchen are in the east end of the building. The room of the officer of the day is in the southwest corner, and is separated from the mess-room by a narrow alley-way running north and south, and ending opposite the door of the kitchen. The kitchen is separated from the room of the officer of the day by a second narrow alley-way running east and west, and from the canteen and water-closet by a third alley-way running north and south. This third alley-way cuts the second opposite the door of the canteen. The canteen and water-closet are in the northwest corner of the building, and directly back of the room of the officer of the day. The upper floor of these barracks is divided into a room over

the guard-room, a middle room, a room over the kitchen and canteen, an officer's room, and a small apartment used by the clerk of the commanding officer. I append herewith a rude sketch of the arrangement of these floors.



Only three of the upper rooms are used as quarters for the men. The room over the guard-room is 33 feet 3 inches long, 11 feet 4 inches wide, and 7 feet 8 inches high, and has a cubic air-space of 2,889 cubic feet. This room has two windows opposite each other, north and south, one 4 feet 5 inches by 2 feet 9 inches, the other 5 feet 3 inches by 2 feet 5 inches. The northern window looks directly into M street, and has slat shutters which are never opened. This room is occupied by fourteen men, who have an air-space per man of 181.4 cubic feet. The room taken up by bunks and other fixed furniture is carefully deducted in estimating the amount of air-space per man. The middle room is 29 feet 7 inches long, 16 feet 7 inches wide, and 7 feet 4 inches high, and has a cubic air-space of 4,381 cubic



feet. It has four windows—4 feet  $5\frac{1}{2}$  inches by 2 feet 6 inches, 4 feet 6 inches by 2 feet 9 inches, 4 feet 6 inches by 2 feet 5 inches, 5 feet by 3 feet 8 inches—two on the south side, one on the north (this last is closed constantly by slat shutters), and one over the alleyway. It contains fourteen bunks, and accommodates thirteen men, who have an air space of  $310\frac{1}{3}$  cubic feet each. In the room over the kitchen and canteen twelve men are quartered. It is irregular in shape and has a cubic air-space of 5,966 feet. It has seven windows, one opening (into middle room) over staircase, one in north side, one in west end, one in east side (over alley-way), two in south side over alley-way, one in south side free. There is a cubic air-space per man of  $472\frac{1}{8}$  cubic feet. The sewerage of these barracks is so defective that practically it would have been better if none had been attempted. The alley-ways are always wet, and the stench from the undrained urinal and water-closet is oftentimes positively nauseating in the kitchen and canteen. The roof of the building must be in bad condition, judging from the traces of leaks to be seen in the upper apartments.

That portion of the guard not quartered in the building above described occupy a large room known as the chapel and a small room adjoining. The large room is 36 feet 9 inches long, 28 feet 2 inches wide, and is surmounted by an arched ceiling 13 feet 2 inches at its highest point. It has a cubic air-space of 11,644 cubic feet. There are six windows in this room, 4 feet  $3\frac{1}{2}$  inches by 2 feet  $8\frac{1}{2}$  inches, placed opposite each other, east and west. Thirty-one men are here quartered, with an air-space per man of  $350\frac{1}{3}\frac{1}{4}$  cubic feet. There are only thirty bunks in this room. One man has no fixed sleeping-quarters. The smaller adjoining room is 18 feet 4 inches long, 16 feet 2 inches wide, and 8 feet 2 inches high, with a cubic air-space of  $2,318\frac{1}{4}\frac{3}{4}$ . There are two windows in this room 4 feet 2 inches by 2 feet 8 inches each. It has a fire-place, and is used by the post tailor

during the day as a shop. At night four men sleep here and have a cubic air-space of  $579\frac{1}{2}$  cubic feet per man. The drainage of the water-closets used by these men is very good. They are in the lower part of the building.

In order that the results of the measurements mentioned above may be seen at a glance, I have prepared the following table:

	Men.	Cubic feet.
Room over guard-room .....	14	$181\frac{1}{10}$
Middle room .....	13	$310\frac{1}{2}$
Room over kitchen and canteen.....	12	$472\frac{1}{2}$
Chapel .....	31	$350\frac{1}{2}$
Room adjoining chapel .....	4	$579\frac{1}{2}$

It is usually estimated that 600 cubic feet is the minimum allowance per man in barracks, and that the air in this space must be changed by ventilation at least twice every hour. (*Vide* Eng. Army Reg.)

You will observe that the quarters assigned the marine guard in this yard are far below the minimum, and that no method has been adopted to insure ventilation. The windows are so placed that in order to secure anything like fair ventilation of the middle of these rooms, the men sleeping near them must be exposed constantly to the weather.

Being curious to know if any increase or excess of disease of the lungs had occurred among the marines at this yard, I determined to examine the reports from the Boston navy-yard and compare the results with those from this yard. The strength of the marine guard at Boston is 63 men. The strength of the guard at this yard is 62 men. (*Vide* Official Reports, January 1, 1877.)

Time would not allow an examination of the records of all the diseases of the lungs and I concluded to select one. Consumption (*Phthisis pneumonia*), it is well known, is of exceedingly frequent occurrence, chiefly on account of climatic causes,

in New England, and particularly in the city of Boston. I therefore chose this disease for investigation.

During the five years beginning January 1, 1873, and ending December 31, 1877, there were three cases of consumption observed by the medical officers of the Boston yard among the marines on duty there; while for the same period six cases occurred among the marines at this yard. To the casual observer these figures may seem insignificant, but to those who know the care that is exercised in selecting the marine corps and the reputation of the men for physical superiority, these figures assume their proper value and point with distinctness to the fact that there is some local cause operating here which subjects the marine on duty at this post to double the risk to life from this disease that he would be subjected to if assigned to duty at the navy-yard, Boston.

It is wholly unnecessary to call attention to the relation of deficiency of air-space to *Phthisis pneumonia*.



# MEDICAL TOPOGRAPHY OF THE INTERNATIONAL EXHIBITION OF 1876.

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REPORTED BY JOSEPH WILSON, M. D.,  
MEDICAL DIRECTOR U. S. NAVY.

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Fairmount Park is in the northwest part of the city of Philadelphia, on both sides of the Schuylkill River. The land of this section is described as rolling, with steep, rounded hills and deep valleys near the banks of the stream. A large portion of the soil is aluminous clay, nearly pure enough to make good bricks, with occasional spots of much more porous material. It has a foundation of primitive and transition rocks.

Before this land was appropriated by the park commissioners it was occupied by farms and country-seats, and it had a rather bad reputation for malarial fevers. The suffering was mostly from intermittents of no great severity, although there have been epidemics of fatal autumnal remittent. The park commissioners in some parts found too much mud for landscape gardening and road making, and they remedied the matter by a pretty free use of common agricultural drain-pipe. This remedied the mud, and appears to have effectually removed the cause of the malarial fevers at the same time, for we hear very little complaint of intermittent fever, either from the park police or from the restaurant keepers, though for several years these have been spending their days and nights about the grounds at all seasons. During the Centennial Exhibition several thousands, by the terms of their employment, were obliged

to sleep within the inclosure, and we have not heard of any malarial fever among them, except of cases which can be fairly referred to the same individuals having previously suffered elsewhere within a year. The great improvement in the character of the land we think is mainly due to the draining of muddy spots—the reasonable use of agricultural drain-pipe by the park commissioners.

A leading object in occupying the banks of the Schuylkill as a public park was to protect the stream from pollution by sewage. The present arrangements keep the building of houses and the sewers at a reasonable distance. There are large sewers nearly parallel with the shore on both sides of the river. They are 8 or 10 feet in diameter, of dressed granite and hydraulic cement. They receive the sewage of the park and of some adjoining districts, of the Zoölogical Gardens and the restaurants, and they discharge into the river below Fairmount dam.

The Centennial buildings occupied an elevated site, west of the river, about a mile west of Girard avenue bridge. The Centennial authorities used the water of the city water-works, and they did not fail to appropriate the excellent sewerage facilities in the neighborhood. The larger buildings were extensively supplied with water-closet conveniences, apparently well connected with the main sewers by terra-cotta pipe. In my frequent visits to the ground, about twice a week for six months, I thought of these things, and occasionally I looked at the water-closets, without ever seeing much to criticise. They were clean in the morning, and some of them were otherwise before night. I have seen people not only washing and arranging their toilet in the wash-rooms, but eating lunch and chatting. These people, by throwing in rags and coarse paper, must sometimes have occasioned annoyance, though I never chanced to see anything of the kind. The “odorless excavator” was occasionally employed in removing these things from the traps. The arrange-

ments were on a large scale, but otherwise the same that we see at the large railroad stations, shoe-blacks included. For neatness and good order these conveniences would compare favorably with anything of the kind that I have ever seen for a large number of people; except, however, the arrangements of most of our large hotels.

But some of the smaller buildings, outdoor urinals, &c., possibly even some of the small restaurants and pop-corn stands, had no proper sewer connections, for the rivulets on the ground were evidently polluted. These rivulets empty into the canal of the Schuylkill Navigation Company, partially separated from the river by long islands of embankment. The water of these streamlets during the very warm and dry weather of July and August had the gray, muddy appearance of the stream of kitchen drainage as we sometimes see it near the back door of a village house; or as we used to see it at all times in the street gutters of our cities. The whole volume of water in one of these rivulets was not sufficient to represent the slops and waste water of any large restaurant, and I perceived nothing offensive about it except this muddy appearance. But this was sufficient to indicate its character without any closer examination. There was no real necessity of converting these brooks into sewers, and emptying the sewers into the Schuylkill River. It seems to be but a part of the sanitary engineering just now in fashion. It is in accordance with this fashion that we see sewage emptied into all the rivers and lakes of our country, not excepting the Schuylkill or Delaware, the Croton or Cochituate, and as soon as it is dissolved or otherwise sufficiently out of sight it is pumped up into reservoirs so that we may drink it over again.

We had nothing to do with the treatment of the sick, and hence from the reliable standpoint of sanitary and mortuary statistics we have not much to say on the subject of prevailing diseases. We have, however, the weekly reports of the board of

health, and a pretty accurate account of the number of admissions to the Centennial inclosure. The board of health report a somewhat less number of deaths than during the corresponding period of the previous year. So favorable a report as this, we were not prepared to expect. According to these reports, the highest death-rate for any one week was nearly fifty-four (53.83) in the middle of July, the average rate being 39.76 per 1,000 for the whole month. In August the rate was 25, and during the following three months about 20 (20.66, 19.74, 19.49). The lowest rate for any one week was 18 (18.45) in October. The regular population, on which these rates are computed, is 825,000, but including Centennial visitors, the actual population must have exceeded 950,000, an increase of 15 per cent. By calculating for this excess over the regular population, we have 47 for the highest death-rate in the middle of July; 17 for the lowest rate in October; 34.8 average for July; 21.8 for August; 18 for September; 17.27 for October. Now, omitting the numerous deaths of children during the hot weather of July and August, this is about the death-rate among healthy people, in a healthy rural district, and for a city of nearly a million of population it is perhaps unprecedented. It would thus appear that the residents of some other large cities were safer from mortal disease at Philadelphia than they would have been at their homes.

With reference to special diseases, these reports show the usual causes of the principal mortality: Pulmonary consumption, cholera infantum, typhoid fever, &c. The only one of these that we suppose to have any connection with the business of this year, is typhoid fever. This disease, according to the weekly reports, caused a much larger proportion of the whole mortality during the Centennial season than during the corresponding period of the previous year; though the number was not excessive considering the great increase of population.



Typhoid fever is now, I believe, universally conceded to be a stercoral disease, with the usual characters of the exanthemata. Its infection is mainly if not exclusively propagated by excrement; it has a definite period of incubation, a well-marked febrile reaction, a well-defined eruption. Now many of the visitors remained very few days; boarded in private houses arranged only for the accommodation of an ordinary family of six or eight persons. These houses did not always have proper conveniences for twenty or thirty boarders—five times their usual population. And again, typhoid fever is received principally, if not exclusively, in drinking-water; and many visitors boarded at Manayunk and Pottsville, Bristol and Trenton. It is quite reasonable to suppose that they contributed something to the amount of common impurities in the water-supply of the city. Hence typhoid fever was to be expected. Those who suffered shortly after their arrival, making due allowance for incubation period, of course received the infection before they came here. Those infected here, unless they remained several days, did not suffer till they had left for their homes. The deaths from typhoid fever reported in the weekly reports must have been of the regular residents of the city, and of visitors who came for a protracted visit.

We see no evidence of typhoid infection about the Centennial grounds. A large number of men from all parts of the country—from nearly all parts of the world—were employed as police force, number varying from 2,000 to 3,000. These men, besides their duties in the day-time, were required to sleep within the inclosure; and they were quite healthy. There were several cases reported of typho-malarial fever, but these appear to have been cases of malarial fever in debilitated subjects; there were none of the enteric symptoms, nor was there any of the characteristic typhoid eruption. There are two deaths of these men reported in hospitals. Of course this is

not the whole mortality, and when sick they must have gone elsewhere for treatment.

But independently of mortuary statistics there was much suffering from circumstances unfavorable to health. Many visitors came from their homes and boarding-houses in the morning to return at night. We saw some of them lunching on popcorn and new cider; others on candy and lemonade. A large portion of these must have suffered from gastric and enteric troubles.

Many visitors, many thousands, indeed, came for only one or two days; brought in baskets and satchels such food as they were accustomed to at their homes; spent hardly any money except for railroad fare. These, notwithstanding their excessive fatigue and poor diet, with very few exceptions, must have returned to their homes in good health, as well as wiser and better.

# INTERNATIONAL MEDICAL CONGRESS, GENEVA, SWITZERLAND.

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REPORT OF ROBERT T. MACCOUN, M. D.

MEDICAL DIRECTOR U. S. NAVY.

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In obedience to the order of the honorable Secretary of the Navy, of the 14th of July, 1878, I proceeded to Geneva, Switzerland, and reported on the 8th of September to the secretary of the International Medical Congress, as the delegate from the medical corps of the United States Navy.

The congress held two sessions a day, the first commencing at 9 a. m., and the second at 3 p. m., in the buildings of the University.

The morning sessions were devoted to the proceedings of the different sections, of which there were six, held in adjacent chambers, namely: 1. Medicine; 2. Surgery; 3. Obstetrics and gynecology; 4. Public health; 5. Biology; 6. Ophthalmology, otology, and laryngoscopy. The afternoon or general sessions, held in the *aula* of the University, were for the transaction of business, discussions, and the reading of papers on medical subjects.

As the proceedings of the sections took place at the same time, in this report I shall give only a summary of those matters of most interest that came under my personal observation.

The opening day of the congress was dedicated to addresses by the president of the committee of organization, discourses by the several delegates of the Swiss Confederation, and an ele-

gant address of welcome by the president of the congress, Professor Vogt.

GENERAL SESSION.

On the second day Dr. Broadbent, of Saint Mary's Hospital, London, read a paper on cerebral localizations, in which he stated that physiological experiments, based on electrical excitement or destruction or extirpation, practiced by Hitzig, Ferrier, Carville, Duret, Nothnagel, and others, have established the existence of a certain zone in the cortical substance of the hemispheres, which is in intimate relation with the nuclei of the motor nerves of the medulla and spinal cord.

This zone is situated, in the monkey and in man, around the groove of Rolando, and particularly in the ascending or marginal convolutions which limit that groove. There exist at this level, regions more or less defined and circumscribed, which are especially connected with the leg, arm, face, &c.

The pathology of this zone accords in a remarkable manner with the results of experimental physiology.

Light lesions, or irritations, may produce epilepsy, with or without temporary or permanent hemiplegia. More extensive lesions, with more or less destruction of the gray cortical substance, may cause monoplegia or hemiplegia.

While thus admitting the localization of a motor zone, a motor centre at the surface of the hemispheres, it must be added that communication between the cells of this region and the cells of the gray horns of the spinal cord cannot be direct. The co-ordinate character and train or succession of movements caused by electrical excitement, the nature of the paralysis produced by the extirpation of a cortical centre, its intermittency, its short duration, the tendency which partial symptomatic epilepsy has to begin in the hand, although the situation of the lesion may differ, and the loss of time in the transmission of electrical excitement, are reasons for admitting the intervention of a

ganglion between the cortical substance and the roots of the motor nerves.

The cortico-motor centres are the points of departure of descending voluntary impulses, the points of origin of ideo-motor actions. The cells of the motor zone (which resemble those of the anterior horns of the cord) are the apparatus by which the dictates of the mind are formulated for transmission without. The best example of the working of a cortico-motor centre is that of the centre of speech, which is the first and most important cerebral localization. Aphasia, without paralysis of the lips and tongue, is an example of what is termed functional substitution, although the substitution is incomplete.

According to the experiments of Hitzig and Ferrier, there exists in the cortical layer a region\* or zone of perception. Pathology, however, has not furnished precise indications upon this subject. But it is known that complete destruction of the occipital lobe does not affect sensation.

The convolutions of the frontal and occipital lobes, those of the insula, or island of Reil, those of the internal sides of the hemispheres, do not respond to electrical excitement. Lesions of these parts of the cortical substance do not produce constant results, and are for the most part without effect. The extirpation of the two frontal lobes appears to diminish the spontaneity and activity of the mind; that of the extremity of the occipital lobes of both hemispheres, seems to abolish the appetite, but these effects do not give a satisfactory idea of the functions of these lobes.

There does not appear to be any special vaso-motor centre in the brain. The vaso-motor system is in relation with the gen-

\* Cette zone s'étend du pli couche, qui est le centre perceptif de la vue, le long de la circonvolution sous-sylvienne du lobe temporo-sphénoïdal, jusqu'à la pointe de ce lobe. De là cette zone retourne, par l'intermédiaire du lobule et du pli unciforme, dont elle occupe le bord interne, vers le lobe occipital dans lequel elle occupe, probablement, le *gyrus calcarinus*.

eral motor system, and, like it, has centres in the spinal cord, in the central ganglia, and in the convolutions; these centres being subordinate to one another. There are likewise no trophic centres, nor special trophic nerves, the trophic influence being common to the whole nervous system.

*Corpora opto-striata.*

The corpus striatum exercises a motor influence. The greater part of the fibres of the crus cerebri terminate in this ganglion, and its faradization causes general contraction of all the muscles of the opposite side; its destruction, either experimental or pathological, produces hemiplegia.

Dr. Broadbent considers this ganglion an intermediate agent between the hemispheres and the cord; its cells being grouped and combined by sensori-motor education, are the apparatus by which the cortico-motor centres transmit their orders to the muscles. The thalamus opticus is also an intermediate ganglion for the transmission of sensations from the ganglia of the sensory nerves to the perceptive centres of the cortical substance. Notwithstanding the numerous objections this interpretation may create, it has the results of experiment and pathological anatomy in its favor. If the localization of the perceptive centres be true, it is anatomically impossible, according to the researches of Dr. Broadbent, that there should be any other channel of communication between the fibres of the hemispheres than that of the thalamus opticus. The facts observed in hemianæsthesia accord with this hypothesis. The corpora opto-striata are, therefore, simultaneously an instrument of the hemispheres and of the automatic apparatus.

As a general interpretation of the symptoms furnished by this manner of viewing the subject, we may say that:

a. Paralysis is a rupture either of the fibres or cells concerned in the mechanism of the motor apparatus.

*b.* Tremors, the effect of hindrance to the conducting power of the white fibres.

*c.* Convulsion (including choreic convulsions), the result of irritation of the gray substances.

*d.* Transient contractions, the effect of pressure on a ganglion.

Since the entire nervous system is a vast mechanism of cells and fibres, we should be able to describe its functions in the terms of cells and fibres, and thus avoid the ambiguity which so greatly impedes progress, by having a true physiological localization.

In the actual state of science, the reporter stated that he had been able to sketch only imperfectly cerebral mechanism.

Professor Schiff opposed the theory of Dr. Broadbent, declaring there were no cortico-motor centres in the brain, and in proof of this statement exhibited a white rat, from which the so-called motor centres of one side had been removed some months previously, but which still possessed perfect movement of the limbs.

#### SECTION 2.—SURGERY.

Professor Esmarch, of Kiel, reported on the principal advantages of artificial ischemia, viz:

1. It saves blood, which in patients already exhausted by prolonged hemorrhages, suppuration, &c., is of the greatest importance; it seems also to exercise a favorable influence in the healing process after operations.

2. Operative incisions are not bathed in blood, so that we can operate as on the dead subject. Which renders it possible—

*a.* To recognize more thoroughly the nature and extent of morbid lesions.

*b.* To execute with greater facility several operations, such as the extraction of foreign bodies, the ligature of wounded arteries, the removal of diseased bone, &c.

*c.* Also, to perform the most important operations with fewer assistants.

3. In alarming hemorrhages, sudden death may be averted by temporarily driving back the blood from the extremities (auto-transfusion). The disadvantages attributed to this method depend greatly upon its defective application. It is thus that paralysis and gangrene have been developed by excessive constriction. On the other hand, elastic compression should not be applied to parts where there are accumulations of pus or sanies, for fear of the production of septicæmia. The compression of veins in thrombosis should also be avoided, as it may give rise to embolism or pyæmia.

The severe hemorrhage, which often occurs at the surface of wounds after the relaxation of the constricting tube, is due to temporary paralysis of the vaso-motor nerves. As a general rule this is easily arrested by the application of cold (*douches glacées*), the elevation of the member, the compression of the arterial trunks, and the compression and galvanization of the wounded surfaces.

Secondary hemorrhages do not occur after amputations, if the ligatures have been carefully applied.

#### GENERAL SESSION.

Professor Schiff gave the results of his investigations relative to the functions of the spleen. He stated that after the extirpation of the spleen, no permanent influence was perceived on the relative or absolute quantity of red and white globules. In the first period after the operation, we observe a considerable increase in the white globules, with or without diminution of the red globules. These alterations do not depend on the absence of the spleen, but merely upon the operative procedures necessary for its extirpation, and these phenomena remain nearly the same, if the preparatory acts are not followed by the extirpation of the organ. After the extirpation of the spleen, swellings of the lymphatic glands or augmentation of the volume of



other glands, is only found exceptionally. The so-called supplementary spleens are absent, even if we allow the animal to live more than a year and a half, and even if the operation was performed during the first weeks subsequent to birth.

The swelling of the mesenteric glands found very exceptionally in animals deprived of the spleen, appears to be due to prolonged partial peritonitis, which is often the result of the operation. The volume of the spleen appears to augment from the fourth until near the seventh hour after digestion.

The spleen, during digestion, or rather stomachal absorption, prepares the ferment, which entering with the blood into the tissue of the pancreas, transforms in that gland, a special substance (probably albuminoid) into pancreto-pepsine, that is to say, into a substance calculated to digest albuminoid bodies.

After the extirpation of the spleen, the pancreatic juice loses its power of digesting albumen, while it retains its other digestive properties. The duodinal digestion is no longer noted for its energy and rapidity, but becomes feeble, as in other parts of the small intestines. After the destruction of the spleen, the substance destined to form pancreto-pepsine accumulates in great part in the pancreas, and may still be transformed into pancreto-pepsine by the chemical influences which after death accompany putrefaction.

After the destruction of its nerves, the spleen remains flaccid, ceases to enlarge, and becomes atrophied, like the erectile tissues in general, whose vascular nerves are paralyzed.

#### SECTION 6.—OPHTHALMOLOGY.

Dr. Warlomont, of Brussels, reported on the indications for the enucleation of the globe of the eye, in its relation to sympathetic ophthalmia. His conclusions were—

1. That sympathetic accidents occurring after wounds of the eye are either primary or secondary. The first take place a few

days subsequent to the injury, the last after a period of months, when the patient has doubled the cape of the first danger resulting from the traumatic injury.

2. When one eye has been destroyed by injury and all hope of the restoration of useful vision is lost, we render an immense service to the patient in relieving him by enucleation, with anæsthesia. He is thus spared the immediate results of ophthalmic traumatism, and is enabled in a very short time to resume his occupation, with the parts in a good state to receive an artificial eye, which can be worn without irritation. He is thus preserved with certainty from consecutive troubles. When we have reason to believe the globe is the seat of a foreign body, the indication for enucleation is still more imperative.

3. When the eye is lost from any cause, traumatic or otherwise, or the stump, which represents it, is the seat of continuous or intermittent, or acute or chronic inflammation, or the nidus of a foreign body, or of a cretaceous crystalline, acting in the same manner, enucleation is indicated as a means of prevention, even in the absence of any sympathetic manifestations.

4. The enucleation of a useless eye, though it be entirely painless, is still indicated if, what is possible even under these conditions, the other eye becomes the seat of symptoms attributable to sympathy.

#### SECTION 2.—SURGERY.

Dr. Verneuil, professor of clinical surgery, of Paris, reported on the influence of traumatism on pregnancy and reciprocally. He stated that surgical interference is not interdicted during pregnancy, but subject to certain rules. We should not operate on the pregnant woman without the greatest caution, and at times refuse abso'utely; but to abstain systematically in all cases would be a grave error. Until further orders, we may adopt the following rules:

1. Operate in cases of urgency, when the affection places the life of the mother in immediate danger.

2. Operate at a fitting moment in affections which, without immediately compromising life, are menacing by their progress, and tend to become incurable for want of energetic interference.

3. Operate in affections which, without interfering with pregnancy or being aggravated by it, become at term the cause of dystocia.

4. Abstain as much as possible in affections which are not influenced by the gravid uterus, and which reciprocally do not compromise pregnancy and parturition, except indirectly.

5. Abstain absolutely in affections which compromise only the form and functions of secondary organs, susceptible of spontaneous cure after parturition.

6. Avoid as much as possible all operations during the puerperal state. In case of danger, act rather during pregnancy, and in other cases adjourn all interference for a period of from two to four months after delivery.

#### SECTION 4.—PUBLIC HEALTH.

Professor Gille, of Brussels, read a report on the proposed Universal Pharmacopœia, first advocated by the International Pharmaceutical Congress, held in Brunswick in 1875, and afterward strongly urged at the sessions of the same congress held at Paris in 1867, at Vienna in 1869, and in St. Petersburg in 1874. The same subject was brought before the Third International Medical Congress held at Vienna in 1873, and also at its fourth session at Brussels in 1875.

The great importance of international uniformity in nomenclature, pharmaceutical preparations, weights, measures, &c., was ably represented. The necessity for it was shown by citing the following differences existing between the adjoining countries of France and Belgium, viz: The official

hydrocyanic acid of the French codex contains 100 parts of the anhydrous acid to 1,000; that of the Belgian codex, 25 parts to 1,000. Again, 12 drops of laudanum of the old Belgian codex contain 1 grain of opium, while 20 drops of the French codex contain only the same quantity. From these facts we may readily imagine what might happen if the prescription of a Belgian physician was prepared in France, or *vice versa*.

In the preparation of the International Pharmacopœia the following propositions were submitted to the Fourth International Medical Congress, held at Brussels in 1874, namely:

A. That the pharmacopœia be limited for the present to energetic medicines, leaving to each country the liberty of completing it according to its own particular requirements.

B. That the International Medical Congress unite with the International Pharmaceutical Congress held at St. Petersburg in August, 1874, to carry out its views, and in conformity with the request of the said congress, invite the Russian Government to induce the other powers to join in efforts to establish a universal pharmacopœia.

C. To express the desire that a certain number of physicians and also of veterinary surgeons be connected with the pharmacutists of the international commission that shall be appointed to take charge of this important work.

In the preparation of the pharmacopœia the following propositions were submitted:

a. The text shall be in the Latin language.

b. The decimal system of weights and measures shall be obligatory.

c. The centigrade scale shall be used in noting all temperatures.

d. The chemical nomenclature shall be established on a uniform plan, (that of Berzelius appeared to be the most favored

by the majority of the members of the Pharmaceutical Congress of St. Petersburg in 1874).

*e.* The names used to designate drugs shall be precise and as simple as possible.

*f.* Important drugs shall be the object of a concise description, and the minimum quantity of the active principle they should contain strictly established whenever practicable. Galenic preparations shall be as simple as possible and described on a uniform plan.

*g.* The maximum of the impurities contained in all chemical products shall be indicated.

#### SECTION 4.—PUBLIC HEALTH.

Dr. Seguin, delegate of the American Medical Association, read a paper on international uniformity in the records and practice of physic, being a summary of a similar report made to the Medical Congress of Philadelphia in 1876.

Time would not admit of any discussion of the two last important questions, and a committee of physicians and pharmacutists was appointed to report upon them at the next meeting of the congress in 1879.

#### GENERAL SESSION.

Dr. Bouchard, of Paris, read a paper on the etiology of typhoid fever, which I note, as he asserted his belief in its ready communicability from person to person, although admitting also its propagation by other causes, as the discharges of the patient, contamination of drinking-water, sewer-gas, &c.

Dr. Mouat, of London, replied that he could not let the assertion pass, in regard to the ready communicability of typhoid fever, without stating that it was contrary to the views generally accepted by the profession in England, at the present day, and that his own large experience for many years in the London hospitals, proved the contrary. The doctor's views were re-

ceived with evident favor, although his usage of the French language caused a good deal of pleasant merriment in the grave assembly.

#### SECTION 1.—MEDICINE.

Dr. Lebert, late professor of clinical medicine at Zurich, and Breslau, read a paper on simple chronic ulcer of the stomach. His report was based on the analysis of 252 cases observed by himself. In 104 of these the observations were made in detail, with 33 autopsies.

Gastric ulcer, consecutive to local infiltration of blood, with circumscribed interruption of the circulation and the formation of an eschar, were chiefly spoken of, although other varieties were mentioned, namely, superficial ulcerations, erosions of the mucous membrane, aphthous follicular ulcers, and the deep inflamed ulcer.

The frequency of gastric ulcer varies greatly in different countries, and in different localities of the same country. As a mean it does not exceed 4 per cent. of autopsies. Simple ulcer of the stomach supervenes sometimes without appreciable cause, at other times under the influence of an anæmic, neuropathic, and perhaps vaso-motor derangement. Hence the frequency of this affection in chlorosis, which is the mask and effect, rather than the cause of the lesion.

The principal clinical forms of the simple ulcer, are, 1st, the acute, with perforation of the stomach and diffuse fatal peritonitis; 2d, the hemorrhagic, with frequent hæmatemesis; 3d, the scorbutic; 4th, the dyspeptic, resembling gastric catarrh, but much more painful; 5th, the gastralgic, with predominance of painful symptoms; 6th, the vomitive, with frequent emesis; 7th, the cachectic, which may simulate cancer.

Vomiting of blood, either pure or of a dark grumous color, occurred in 4 per cent. of the clinical cases, and was the cause of death in 3 per cent. Mortuary statistics, based on the most dissimilar documents, give a much greater mortality, but they

have a very limited value, being the expression of no proportion, whatever, between morbidity and mortality. It is the same with perforation of the stomach, which was fatal in  $3\frac{1}{2}$  per cent. of the clinical cases. This form occurs, especially, in females, from puberty to the thirtieth year, and in males after the thirtieth year. The chloro-anæmic diathesis in young women predisposes to perforation, which may take place at a moment when the health appears quite good.

The disease, even in favorable cases, has a mean duration of at least from three to five years, with alternations of exacerbation and amelioration. It may be latent, the healing and cicatrization taking place almost without any symptoms. The duration may be much shorter, in cases that recover as well as in those that terminate fatally. It may last for many years, the case then presenting the morbid history of several ulcers, formed at different epochs of life.

Termination by death took place in 8 per cent. of the clinical cases. Rarely fatal during the first year, it becomes more so in the second, and much more so in the third; the danger increasing with the duration of the malady, if it is continuous.

The frequency of a fatal termination has been singularly exaggerated by authors who have given only mortuary statistics. Relapses are common; a fresh ulcer appearing after a long period of health is a favorable prognostic, as it generally heals like the first.

External fistula is not grave, while gastro-pulmonary and gastro-colic fistulæ are generally if not always fatal.

The relations between simple ulcer and cancer have been very little studied. The coexistence of the two affections was, however, demonstrated in eight of the cases.

The treatment of gastric ulcer should be chiefly hygienic. The best results have been obtained from a milk diet; and the necessity of a very gradual return to a more varied and substantial regimen was strictly enjoined. For a long time after

recovery the diet should be carefully regulated and watched. Constipation is to be avoided by aperients, and among these aloes is the best. If pain is not relieved by the regimen, anodynes must be used, especially opium or morphia, administered subcutaneously. Among alteratives subnitrate of bismuth and nitrate of silver are useful. But all medication, not absolutely necessary, should be avoided. Ice and astringents will serve to combat hæmatemesis. Finally, the symptomatic treatment detailed at length in the reporter's work was referred to as being the more necessary as no specific method exists.

During the sitting of the congress Dr. Bouchut, of Paris, gave an interesting conference on the diagnosis of meningitis by the ophthalmoscope, with numerous demonstrations.

Dr. Hayem, also of Paris, lectured on the different means employed in the examination of the blood.

In conclusion, it affords me great pleasure to state that the warmest hospitality was extended to the delegates during their stay in Geneva. Many brilliant receptions, both official and private, were given in their behalf, and at the close of the congress they were invited to make the tour of Lake Geneva. A fine steamer was specially prepared for this interesting occasion, and there were 600 invited guests on board, of both sexes, among whom were representatives of every civilized country in the world. The steamer made the entire circuit of the lake within a short distance of the shore, in order to have a near view of the ripening vineyards and quaint villages and towns that skirt its banks, visiting the historic castle of Chillon, Lausanne, Vevey, &c., *en route*. A sumptuous breakfast was served on the upper deck, enlivened by the music of a fine regimental band. The day was superb, the sky cloudless, and the lofty Alps, with the snow-crowned peaks of Mont Blanc, were clearly visible in all their grandeur and beauty.

By a unanimous vote, Holland was designated as the place of meeting for the next congress, in 1879.



## TURKISH HOSPITALS, AND MEANS FOR TRANSPORTATION OF SICK AND WOUNDED IN THE TURKISH ARMY DURING THE LATE WAR.

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REPORTED BY JOHN C. WISE, M. D.,

PASSED ASSISTANT SURGEON U. S. NAVY.

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It was my desire to furnish tables of mortality after operations, but they have been kept in so few instances as to render this impracticable.

I can only offer in apology for the meagre character of this report, the absence of anything like a well-organized medical and surgical department in the Turkish army.

Prior to the Crimean war Constantinople possessed no establishment of any importance for treating the sick ; during that struggle, and mainly through English influence, many large general military hospitals were built, of which Haider Pasha at Scutari, and the Malt Epé in Stamboul, are the type.

Haider Pasha is the largest permanent hospital in the empire; it is built on an eminence overlooking the Bosphorus between Scutari and Kadikeny. The style of architecture is that of a square inclosing a court, and though this is a deviation from established principles of construction, the objection is reduced to a minimum by the superiority of the locality and the prevalence of strong winds, always insuring good, natural ventilation. The building is two stories high, each story containing twenty wards 80 by 18 feet, and 16 feet high; the wards open on a corridor (half the width of the former) which overlooks the court. The wards are light and airy, each containing ten win-

dows; the floors are of soft wood, and the walls are of brick, lightly covered with cement. Heating is accomplished by stoves burning hard wood and placed in the centre of the wards. Lighting is by oil-lamps. Two large shafts pierced with holes run from the basement to the roof, to assist in ventilation. The bedsteads are of iron, with woolen mattresses. The latrines are simply holes in a marble floor and connecting with sewers emptying in the sea. The kitchen and administration occupy part of the first floor. Two detached pavilions, accommodating fifty cases each, serve for the reception of operations of any magnitude. At the time of my visit (October, 1877), the hospital contained 1,350 medical and surgical cases, it being necessary to occupy the corridors.

Inseparably connected with the memories of this and other military hospitals here is the name of Florence Nightingale, who did so much during the Crimean war to mitigate human suffering and to promote efficiency in hospital administration. Lady Strangford's efforts during the late Turco-Russian war will ever remain an instance of devoted humanity and exalted self-sacrifice, visiting as she has the outlying posts and even the passes of the Balkans to perform her noble work.

In the court of the Imperial School of Medicine at Stamboul, Baron Mundy superintended the construction of what he called a "model barrack hospital." The building had a foundation raised not more than a foot above the ground, with a length of 105 feet by 27 feet in width, the pitch being 11 feet; it contained seven skylights 4 by 3, and a similar number of windows on each side of the same dimensions; the doors were four in number, two at each end. This apartment was divided in the centre from within a few feet of each end by a wooden partition, running up to the ridge of the roof; at each end of the wards a space was curtained off for the surgery and pharmacy, also serving for the nurses' apartment. Each ward contained twelve

iron bedsteads, furnished with woolen mattresses and cotton sheets. These apartments looked extremely cheerful, and were liberally supplied with porcelain stoves, swinging lamps, ward-cars, portable closets, &c.

Not to discuss more minutely a building intended mainly as a model for hospital construction in the Turkish service, two objections of magnitude at once present themselves, viz, placing the building almost on the ground, and dividing the wards to the roof; but I must mention a provision which to a great extent annihilates the latter objection. An arrangement is made by which the wooden sides in warm weather are made to slide like doors, and twelve canvas curtains with rings and running on a rod are made to supply their place, thus easily regulating the amount of light and air.

High authority has testified to the excellence of administration in most of the military hospitals around Constantinople. Despite this there exist many defects, mainly due, I am sure, to lack of money; others again to the peculiarity of the Turkish character in resisting foreign invention. The wards are neat and clean, though too often wet; the beds comfortable, the food of good quality, the nursing careful; but I am sorry to say the professional attention not always skillful. This criticism is not intended to include foreigners in the staff of the Turkish medical service, but applies alone to Turkish surgeons, generally educated in the empire. The causes of this inefficiency I had occasion to speak of in a former report.

There is a marked lack of mechanical skill in hospitals here, though its utility is recognized. An outhouse near Haider-Pasha was found to contain a quantity of apparatus used in the Crimea; though antique they were seized upon greedily; the weight and pulley, the fracture-box or inclined plane are seldom, if ever, seen. Side by side with this state of affairs exists a laudable spirit of investigation touching Liston's antiseptic

treatment of wounds, Esmarch's bandage, the simple roller, and ordinary tourniquet in amputations.

All officers of the medical staff with whom I have conversed, and I have met a large number, admit a very high rate of mortality in their surgical cases; the reasons are palpable as the causes are cogent. A very large majority of amputations are secondary; few are made on the field, the patients being usually transported in *arobas* for days, over the worst of roads, until they arrive at some great depot, like Philipopolis, Adrianople, or Eski-Zagra. When in hospital the patient's consent to an operation, which is necessary, is generally difficult to obtain. Again, as the soldier is too poor to purchase an artificial limb, and his government does not furnish it, the operation is made higher than necessary, so that the old wooden peg may be worn.

The fine physique of the Turkish soldier, if he has led an open-air life and practiced temperance, should tell favorably in tables of mortality after operation. I do not credit the report, at one time quite common, that the Ottoman Government *seeks* to avoid the burden of the wounded by leaving them where they fell. That this is the case, however, there can be little doubt; but it results from an insufficient ambulance organization; it is "an error of the head rather than the heart." The Turkish soldier fights against the truth, that if he falls wounded he will be left to die on the field of battle so far as help from his own people is concerned.

The societies of the Red Cross and Red Crescent and the Stafford House Committee have done much to supply the want of a well-regulated medical branch of the Turkish army. Through the efforts of these organizations competent surgeons, skilled nurses and apothecaries, medicines, surgical instruments and appliances, provisions, stretchers and ambulances, have been sent to the front, while later in the war trains were run under their direction for bringing serious cases to the general hospitals at Adrianople and Stamboul.

Of all the charitable institutions which aided the Turks in their late war, the Stafford House Committee has probably rendered the most efficient service. Mr. Barrington Kennet, who was at its head in Constantinople, is a man who has devoted his life to the amelioration of sufferers by war, and from his report I will give a synopsis of the work of this committee. The following hospitals were organized and operated: Sofia, 150 beds; Adrianople, 200 beds; Gallipoli, 400 beds; Roustchouk, 210 beds; Philipopolis, 200 beds; Salonica, 430 beds; Constantinople, 100 beds; Ezeroum, 200 beds; hospital of Lord Blantyre at the same place, 200 beds. Besides the ambulance-trains which served with the army of the Lom, there were the Balkan ambulances, which served at the battles of Tirnova, Eski-Soghra, around Shipka, at Otlaukany, and followed Suleiman in his retreat across the Rhodope Mountains, besides other less important trains. The carcasses of 3,600 horses were buried, and between Tehorlon and Constantinople 17,000 sick and wounded were cared for independently of hospitals.

The following is from the letter of a medical officer to the Levant Herald:

*“Il est réellement difficile de concevoir, quel eut été le sort des blessés Turcs, pendant l'été passé, sans l'aide des médecins, des soins chirurgicaux, et par-dessus tout, des chirurgiens si libéralement fournis, par les sociétés nationales et le Stafford House. Il n'est que trop évident, que de grands nombres de soldats seraient morts, si ce n'avait été, l'aide opportune, sur le champ de bataille, car leur propre chirurgiens sont beaucoup trop peu nombreux, pour un travail si énorme.”*

I will add in this connection, by way of contrast, the following description from a reliable person, serving with the Russian army of the Danube:

*“As to medical officers, they have not been furnished extravagantly to the army, yet the care of the sick has not been neg-*

lected. Behind the army there are 54 temporary hospitals, with 600 beds each. To each hospital are attached 10 surgeons; besides a surgeon in chief of field hospitals, there is one to each division, with three surgeons in addition to the regimental surgeons. The means adopted for transporting the Turkish wounded have been, so far as the proper authorities were concerned, of a most primitive character."

Although some of the vehicles and ambulances employed in other campaigns have been used, still the great mass of the wounded have been transported in the *aroba* (or ordinary wagon of the country) to some general hospital or railroad depot.

In the latter part of 1877, Baron Mundy introduced the "train sanitaire"; this consisted of cars arranged for severe and slight wounds; for slightly wounded men the entire length of the car was occupied by a double inclined plane or sofa, with a central back, serving for two rows of men, sitting "dos à dos." The sofa was made of ticking stuffed with straw. Cars for conveying the graver cases had two rows of litters, suspended in three tiers; the litters were furnished with feet, moving on a pivot, by which they could be converted into a bedstead; thus the soldier is picked up on the field and carried to the hospital or cars, where the litter is swung or made into a bed.

To the "train sanitaire" is attached a complete kitchen from which the wounded are served with soup and "pilop," a savory dish of boiled rice flavored with meat. The wounded complained of the constrained position on the sofas, and it was suggested to make them more in the form of an ordinary seat. The swinging litters answer well if the cars are run with care, but sudden starts and stops, from the motion they create, cause great discomfort.

The *aroba* is a primitive wagon, illy adapted to carrying the wounded, the great objection being the absence of springs or any means to relieve the jar; it is usually drawn by two oxen;

the floor is covered with straw, and a canopy raised overhead; it will carry eight persons in a sitting and four in a lying posture. The Red Crescent Society use an ambulance the size of an ordinary wagon; the floor is covered with a mattress, split in its length, and two litters are swung from the roof. When it is desired to carry the wounded in a sitting posture, the litters are omitted, the mattress turned back, portions of the floor moving on hinges are turned up, forming seats and uncovering a semi-cylindrical space, into which the feet are placed. This society also used, when practicable, a sled-ambulance, covered by hoods rising from either end.

The wheel-litter of Noyes was sometimes in requisition on the smooth roads about the capital, for which it is only serviceable.

Baron Mundy invented for transportation in the passes of the Balkans, what he called the "brancard de montagne." This consisted of a chair, the high back and foot-board of which formed an inclined plane; two arms pass off from the back and are hollow and padded to fill the shoulders of the porter, across whose chest broad bands pass diagonally from one arm to the other. If it should be necessary to employ two men there is an arrangement by which shafts can be shipped on either side.

The wounded about Shipka were transported almost entirely on the ordinary stretcher.





## MADEIRA AS A SANATORIUM.

BY ANDREW M. MOORE, M. D.,  
PASSED ASSISTANT SURGEON U. S. NAVY.

Madeira, situated between  $32^{\circ} 49' 44''$  and  $32^{\circ} 37' 18''$  north latitude, and  $16^{\circ} 39' 30''$  and  $17^{\circ} 16' 38''$  longitude west from Greenwich, has been long known as a sanatorium for consumptives. The name applies to a group of five isles within the above boundary, and particularly to the largest and most important. Its beneficial influence is due to equable temperature and dryness of air, aided by invigorating sea-breezes. Physicians of the place speak highly of its curative power in the initial stage of phthisis. But when softening has commenced, accompanied by considerable destruction of pulmonary tissue, and marasmus, it has no apparent ameliorating effect upon the disease—not even to retard its progress. It does not prevent the development of tubercle, as shown by the number of cases among the natives. The poorly fed and those who live in imperfectly ventilated houses are the principal sufferers; and of this class, seamstresses furnish the greatest proportion of cases. Below are given the maximum, minimum, and mean of monthly temperature, calculated from the observations of different observers, for each month of the year, viz :

Month.	Maximum.	Minimum.	Mean.
	°	°	°
January .....	70	50	62.18
February .....	73	51	62.18
March .....	75	51	63.46
April .....	78.5	53	64.07
May .....	77	52	65.82
June .....	80	58	67.45
July .....	80	61	71.52
August .....	82	64	73.71
September .....	85	63	73.98
October .....	80	58	69.92
November .....	78	52	66.68
December .....	75	53	63.76

It is thus seen that the highest average temperature is 85°, September, and the lowest 50°, January. Difference between the extremes, 35°.

Below is given the average hygrometric state of the air, as shown by the difference between the dry and wet bulb thermometers, taken from daily observations for eleven successive months of 1850-1851, viz:

Month.	Hours.	Temperature.		
		Dry.	Humidity.	Difference.
		°	°	°
1850-1851.				
June.....	9 a. m.	64.33	59.25	5.08
	2 p. m.	64.92	59.01	5.96
	7 p. m.	58.75	56.42	2.33
July.....	9 a. m.	65.77	60.55	5.24
	3 p. m.	65.68	60.63	5.05
	7 p. m.	61.95	57.92	4.03
August.....	7 a. m.	65.19	58.92	6.27
	3 p. m.	67.2	61.02	6.18
	7 p. m.	63.04	57.52	5.52
September.....	8 a. m.	69.08	64.48	4.6
	2 p. m.	72.56	66.06	6.3
	6 p. m.	68.6	64.33	4.27
October.....	8 a. m.	68.77	63.48	5.29
	2 p. m.	72.74	65.86	6.88
	6 p. m.	70.24	64.62	5.62
November.....	8 a. m.	63.83	58.33	5.6
	2 p. m.	70.16	62.35	7.81
	6 p. m.	66.46	66.46	0.08
December.....	8 a. m.	60.37	55.87	4.5
	2 p. m.	65.67	59.01	6.66
	6 p. m.	62.38	59.03	3.45
January.....	8 a. m.	59.9	55.3	4.6
	2 p. m.	66.21	59.57	6.64
	6 p. m.	62.24	57.4	4.84
February.....	8 a. m.	57.5	53.32	4.18
	2 p. m.	63.98	57.7	6.28
	6 p. m.	59.46	55.1	4.36
March.....	8 a. m.	61.27	55.17	6.1
	2 p. m.	66.74	59.19	7.55
	6 p. m.	62.71	58.71	6
April.....	8 a. m.	93.15	57.78	5.37
	2 p. m.	68.73	61.8	6.93
	6 p. m.	64.73	59.76	4.97

Funchal, the principal town, is located on the southern side of the island, on the border of the sea. There is a gentle inclination from the shore-line here, which becomes more abrupt with the increase of distance, until an altitude of more than 6,000 feet is attained, with a corresponding increase of temperature.

There are four hospitals here, viz : General, military, consumptive, and that for *Elephantiasis Græcorum*.

The first named receives all cases indifferently. It can accommodate from 125 to 150 persons, and from 600 to 1,100 are treated here annually. It is very far behind the age—ill lighted, ill ventilated, and badly conducted. Dirt and bad odors abound. Grass mattings are used for spittoons, and retained until they are saturated with offensive expectoration. It was founded in 1685. One of its apartments has been used as a school of medicine since 1838.

The military hospital is, as its name indicates, devoted to the treatment of the sick and injured soldiers of the garrison—about 1,000 strong.

The hospital for true leprosy will accommodate 20 or 30 cases, is very rude in its construction, and conspicuous by the absence of any evidence of comfort. On my visit there it contained nine miserable lepers, whose appearance seemed in harmony with their surroundings. The disease is confined exclusively to the laboring poor, those who work hard and subsist upon an unwholesome and insufficient diet. Such are the necessary conditions for the generation of this loathsome affection in the first place. But when once induced it is extremely liable to be transmitted from parent to offspring. Supporting measures and potassium iodide are resorted to for the prolongation of life and to render the patient's condition more tolerable; but without any hope of cure, as it is invariably fatal. Duration of life is from three to twenty-five years.

The hospital for consumptives contains only 24 beds. It provides for the treatment of Brazilians and Portuguese as well as for natives of Madeira. It is pleasantly located, and exhibits in its construction all the modern conveniences and comforts of a place of the kind. It is well lighted, warmed, and ventilated, and kept scrupulously clean. Sisters of Charity act as

matrons, laundresses, nurses, and pharmacutists; and it is largely due to their labors that its administration is so efficient.

Teneriffe has not the celebrity of its neighbor Madeira, although equally benign in its influence upon pulmonary affections. At Santa Cruz there is a commodious general hospital, which is built of masonry, and contains in its architecture no modern improvement. As regards ventilation and lighting, it is deficient. No statistics worth recording could be obtained.

The climate of the Cape de Verde Islands is deleterious. Malaria abounds. At Porto-Praya, St. Jago, there is a hospital, but which is not worthy of description or imitation.

# TRANSPORTATION OF THE SICK AND WOUNDED OF VESSELS OF WAR.

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REPORTED BY ALBERT L. GIHON, M. D.  
MEDICAL INSPECTOR U. S. NAVY.

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The want of a suitable and always serviceable means for the transportation of officers and men injured aloft or on deck, or wounded in action, to the sick-bay on the berth-deck or other lower deck, and especially for the removal of these and other invalids to another vessel or to a hospital on shore, induced the writer to devise the "Ambulance Cot" bearing his name, which was included in the display of the Bureau of Medicine and Surgery at the International Exhibition of 1876, and which, having since been adopted by the Navy Department as a part of the outfit of vessels of war, he takes this method of making better known to his colleagues in the naval service.

The ordinary "hospital cot" was for many years the only means available for these purposes, and often, when most quickly needed, this could not be got ready. Even when there was one required to be kept constantly rigged, it was not unusually occupied by some bed-ridden invalid who could not be displaced, and the necessity arising for another, the carpenter's mate or his assistant had to be sought to break out the several pieces of the clumsy frame from their place of stowage in some corner of the hold, or perhaps under the hammocks in the nettings. When found these would not always fit together, and when fitted more time was consumed in the slow process of lacing a canvas

sacking, six feet long, around the wooden frame, and adjusting the



latter thus covered in the cot proper, of which the sides had then also to be laced together, the whole forming, when all was done, a clumsy canvas box, usually too short for the occupant, and not easily taken hold of and carried. It was never suitable for lowering a wounded man through a narrow hatchway, the utmost care being necessary on the part of four or five assistants to prevent the patient sliding down to the end of the cot, perhaps upon a fractured leg or thigh, or, especially when

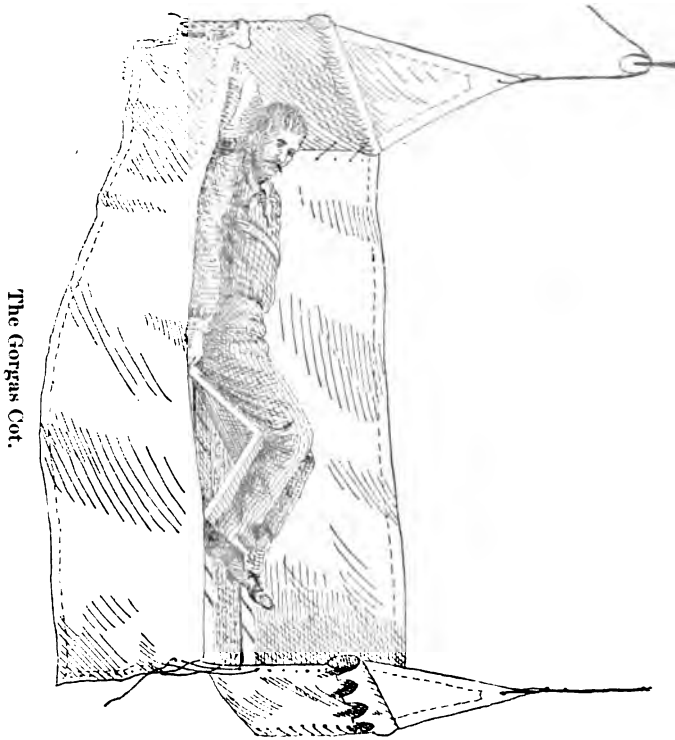
himself helpless or unconscious, from pitching out headlong.



In practice, therefore, most medical officers have depended upon the hands of two strong men, crossed after the fashion of the "lady's chair" of children's play, on which the patient could

be seated with legs dangling, supporting himself with his arms

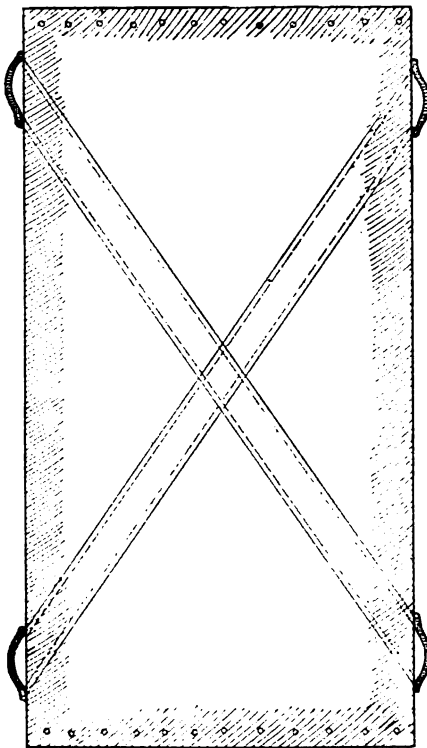
around his bearers' necks, or when unable to do this, being held in place by other assistants; but in cases where the inferior extremities are severely injured and require tender handling and support, this method will not answer, nor is it feasible, when the ladder is not wide enough for two men to descend abreast.



The Gorgas Cot.

Medical Inspector Albert C. Gorgas, U. S. Navy, in 1864, devised an apparatus which was intended to obviate the objections to the hospital cot as a means of transport, and in recent years this has been in use on board many vessels of the Navy. Its chief peculiarity is a leather-covered double inclined plane,

raised and lowered by a hinged centre and made to work upon a wooden ratchet attached to each side of the lower half of the cot-frame. The thighs and legs being flexed over this plane, its upper surface sustains the weight of the body, when the head of the cot is elevated, while a narrow leather band, passed through two long leather or canvas loops nailed to the upper



The Wells Hammock (under side).

cross-piece of the frame, is tied around the chest, under the arms, and prevents its tilting forward. The body is also partly supported by the breast-strap, but its lower two-thirds are not confined in any way, and as the edge of the inclined plane is apt to slip out of the notches in the ratchet-pieces, its entire weight would have to be sustained by this strap to keep the patient from falling out; while, notwithstanding the rope handles on the canvas head and pieces, the apparatus is essentially the same unwieldy hospital cot, which is not easily handled, and

is not at all fitted to be carried any distance.

Surgeon Henry M. Wells, U. S. Navy, has proposed an ingenious modification of the ordinary hammock, by which it may be used, in certain cases, for the carriage of the sick and injured. Two long strips of canvas are sewed diagonally across



the under surface of the hammock and terminate on each side in rope handles, by which it may be carried, the patient resting on mattress, blankets, and pillow; but even when wooden stretchers

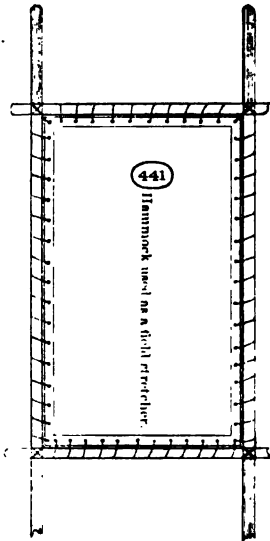
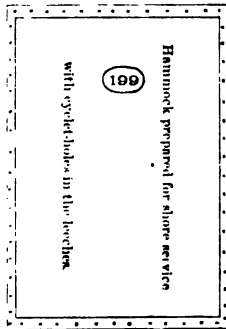


Wells's Hammock in use.

are attached to each clew, the apparatus, though it may be advantageously used instead of the crossed

hands, lacks the rigidity which can only be secured by a solid frame, and without which it cannot with safety or comfort to the patient be used to swing him over a ship's side into a boat, or to support him during his passage on shore.

Lieut. T. B. M. Mason, U. S. Navy, has also suggested a method of utilizing the common ship's hammock for ambulance service with landing parties. Eyelet-holes are worked along both leeches of the hammock, as well as across its ends, permitting it to be laced and stretched upon a wooden frame made of poles and stretchers of the proper length.



Mason's Hammock Stretcher.

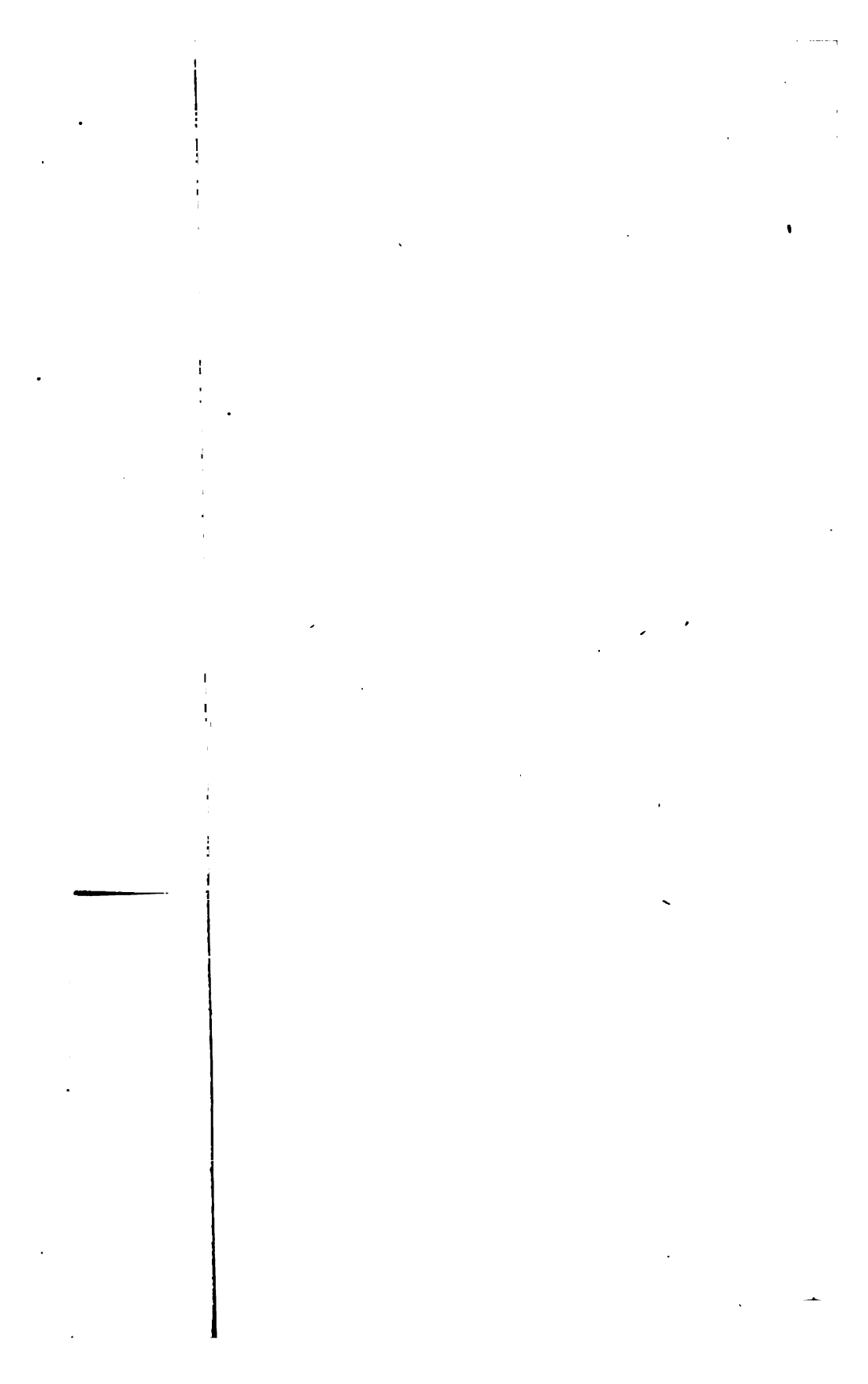
While this, and the other apparatus referred to, will serve as useful expedients under many circumstances, when other means are lacking, it is important that provision should be

made in the outfit of every vessel belonging to the government to meet an exigency that may occur at any period of its commission. By direction of the Navy Department, therefore, the "Ambulance Cot," which I had proposed with this object, was submitted to a board of officers, who made the following report:

"UNITED STATES NAVY-YARD,  
" *Washington, D. C., July 5, 1877.*

"SIR: In compliance with your order of the 29th ultimo, we have carefully examined the 'Ambulance Cot' submitted to us, and have to report that it seems to accomplish all that was proposed by Medical Inspector Gihon in planning it. It enables a man to be lowered endlong through a hatchway or from a top without falling out, the band around the breast preventing him from falling forward, the bands under the thighs supporting his weight. If the legs be injured there are additional bands to confine them. The cot also permits a man to be swung over a ship's side in a heavy sea-way, and landed in a boat without danger of falling out. He is to remain in the cot in the boat, the elastic side-pieces making a comfortable spring-bed. On shore he can be placed in any kind of wagon, the ends of the side-pieces being placed on any sort of support, and the springing of these side-pieces will prevent jarring. If there is no wagon about, two or four men can take hold of the extremities of the side-pieces and walk away with him to his bedside in a hospital. When not in use the staves and stretchers can be unshipped, placed inside the canvas, and the whole rolled up compactly and placed between the beams overhead.

"The model is very well made, and is by far the best and most complete ambulance cot that we have seen in the naval service. This model is 7 feet in length by 3 in width. Should these dimensions be considered too great they can be reduced





to 6 feet in length by 2½ feet in breadth without affecting the efficiency of the cot.

“ Respectfully, yours,

“ O. C. BADGER,

“ *Captain, U. S. N.*

“ F. M. GUNNELL,

“ *Medical Director, U. S. N.*

“ T. D. MYERS,

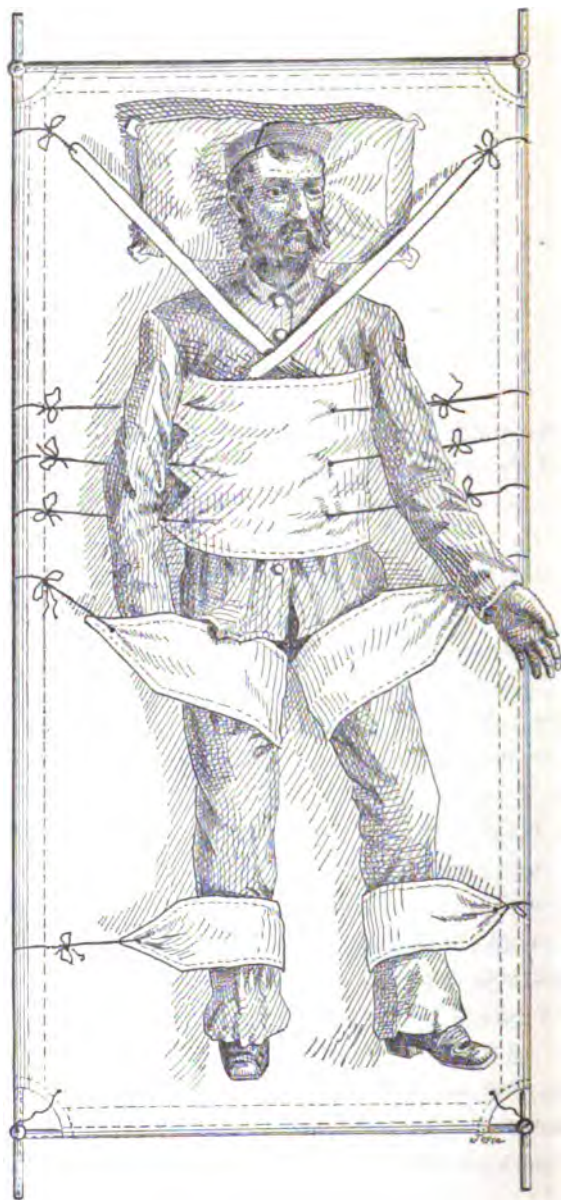
“ *1<sup>st</sup> Asst Surgeon, U. S. N.*

“ Commodore J. C. FEBIGER, U. S. N.,

“ *Commandant.*”

Upon the endorsement of this report by the Surgeon-General of the Navy, and by his recommendation the Chief of the Bureau of Equipment and Recruiting has authorized the issue of two ambulance cots of this description to every vessel in the Navy having a complement exceeding two hundred and fifty officers and men, and one to every vessel of which the complement is less than this number.

The apparatus consists essentially of an oblong piece of stout canvas, 7 feet long and 3 feet wide, with the sides (leeches) and ends doubled and sewed to form casings to receive two staves of tough elastic wood (preferably of bamboo) 8 feet long, and two stretchers of the same material 3 feet long. The extremities of these longitudinal staves are rounded to form handles, and are passed through metal castings on the ends of the transverse stretchers, the whole forming a springy portable bed or litter. Two metal pins attached by lanyards to the lower corners of the cot can be passed through holes in the adjoining castings, binding the stretchers and staves together, so that they cannot slip one upon the other, although there is little danger of this happening. A canvas band, 12 inches wide, securely sewed to the cot, is intended to envelop the thorax,



Patient ready to be lowered into a boat or through a hatchway.

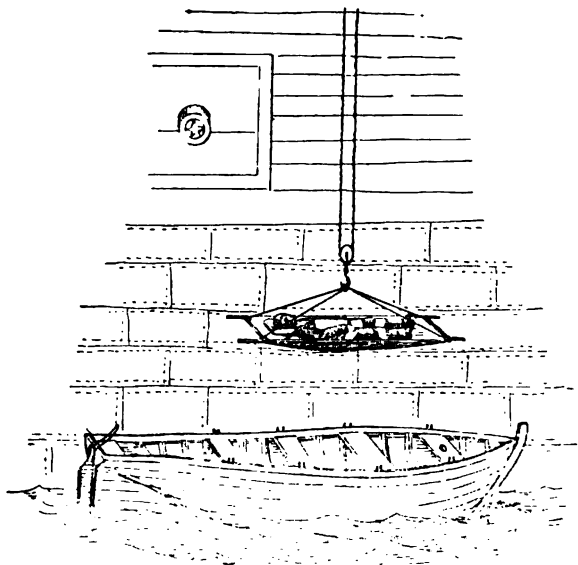
and is attached to the sides of the cot by cords passed through eyelets in the canvas. Two narrow straps attached to the upper edge of the chest-band pass one in front of each shoulder, and being also fastened by cords to the cot-frame assist in keeping the chest-band in place, should this be found necessary. Two canvas bands, 7 inches wide, sewed to the cot, as shown in the diagram, receive and envelop each thigh, and are likewise made fast to the cot frame by terminal cords. These femoral bands sustain the principal portion of the weight of the body, when the head of the cot is elevated toward the perpendicular, without injury or discomfort to the person suspended, however long this may be necessary, as may very readily be proved by trial. Two smaller bands, 5 inches wide, sewed to the cot on each side near the bottom, are intended



to be passed around the legs and fastened to the cot frame. Ambulance cot being lowered through a hatchway.

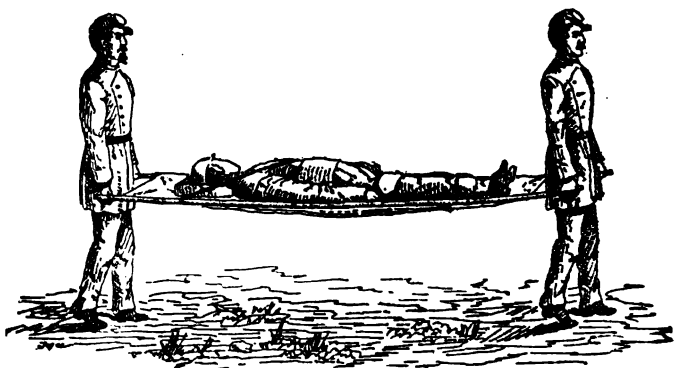
should the thighs be injured or should it be necessary to confine either or both legs for any other reason. A canvas-covered soft hair pillow, loosely attached to the cot by cords passed through eyelet-holes completes the apparatus, and being removable does not interfere with the proper cleaning of the cot when soiled.

A sling with cringles properly placed in the middle and on each side near the upper stretcher enables the cot to be lowered



Ambulance cot being lowered over a ship's side into a boat.

endwise through a hatchway or from aloft, or to be swung horizontally over a ship's side into a boat. The rounded extremities of the side staves may rest on the thwarts of the boat, or on blocks in a wagon or other vehicle, thus protecting the pa-

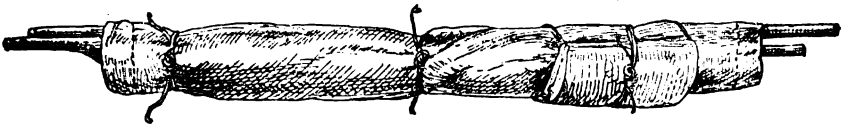


Ambulance cot used for carrying invalid to hospital on shore.



tient from pressure from any hard, unyielding surface, and forming a comfortable bed during his transfer to his destination, or they may be conveniently taken hold of by two or more men and carried to the very bedside in which he is to be placed, the weight of the entire apparatus being only 32 pounds.

When not in use the stretchers may be unshipped and the cot rolled upon the staves into a bundle 8 inches in diameter, which may readily be stowed between the beams overhead, in some place where it will be out of the way but always easy of access, but where it ought not to remain at any time long un-



Ambulance cot rolled up to be stowed away.

disturbed. It should be used experimentally at every exercise at general quarters and battalion drill, that both officers and men may become familiar with its mechanism, and able to adjust it for use with the least possible delay and awkwardness.

I am indebted to Cadet Engineer John U. Crygier and Cadet Midshipman John B. Bernadon for the sketches which accompany this article, and which thus further practically illustrate one of the fruits of the system of education pursued at the Naval Academy, which, among other acquirements, places the pencil in the hands of every one of its pupils.



## VACCINATION IN JAPAN.

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BY ABEL F. PRICE, M. D.,

SURGEON U. S. NAVY.

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I wish to call the attention of the Bureau to the method of obtaining bovine virus for vaccination at Yokohama.

Through the kindness of Mr. Stevens, the chargé d'affaires at our legation at Tokio, I have obtained the requisite number of tubes for the vaccination of the officers and crew of the *Monocacy*, and in my next quarterly report I will present to the Bureau the results of its use. Mr. Stevens informs me he can procure all that the fleet surgeon may require.

In the outskirts of the city of Tokio there exists a vaccine farm. It consists of a space of about two acres in extent, with a central building of stone for the necessary offices, and several sheds in which the calves are kept that are used for the perpetuation of the virus.

While I was there, they had two young calves that had been inoculated on the previous day with the contents of a capillary tube, obtained from the matured vesicle of a preceding infected animal. A space of about six inches square had been shaved on the under and after part of the belly of each animal, on which sixteen or twenty points of inoculation had been made by a lancet of a spear-head shape.

I was informed that on or about the seventh day the contents of the matured vesicle would be transferred to capillary tubes. This vaccine matter is sold to doctors only, at a very reasonable

price. The charge is ten cents for each tube, which is supposed to be sufficient for the vaccination of five persons. Apothecaries or dealers in medicine cannot obtain it.

Vaccination is usually performed among the Japanese during the first three months of infant life. It is performed directly from arm to arm by means of three punctures, a vesicle eight days old being used. Recourse is had to the original bovine matter once in three months.

Vaccination is practically compulsory in Japan. There is no fine imposed for not being vaccinated, as the people are much opposed to fines and taxes. They are, however, very obedient. The operation is in charge of the municipal or provincial departments, and a complete record of all the births is kept.

After three months, if the child has not been vaccinated, an order is sent to the parents to bring the child to the place set apart for the purpose. If this be not obeyed, the delinquent is summoned to appear before the ward or district official, but no reason is assigned for the summons. When he comes he is well scolded for his neglect of vaccination. If this does not prove effectual he is ordered to appear in the same manner before the governor of the province. For neglect of either of these summonses, official and general in their nature, fines may and would be imposed. These official reprimands would be repeated as often as necessary; and they consume so much time and are so troublesome that the most inveterate opposition to vaccination would be vanquished.

A charge of five cents is made for the operation.

In the year 1874, during an epidemic of small-pox, a system of registration of those vaccinated, by certificate, was introduced in Yokohama by Dr. D. B. Simmons, which has since become universal in the empire. Each child on being vaccinated receives one of these certificates, which may be demanded for inspection at any time. It contains the name and residence of

the vaccinator and the date of the vaccination. It gives also the name of the person vaccinated and the department, town, and district in which he lives. It certifies under seal that the person was vaccinated at such an age, on such a day of the month and year, on the right or left arm, with a specified number of punctures. On the back of this certificate there is a little history, which has doubtless done much to prevent any decided opposition to the operation. It is as follows:

"Small-pox is the most virulent of all epidemic diseases. From early times to the present no one has been able to escape this disease. In 1798 an Englishman by the name of Jenner inoculated the cow-pox in human beings, which was the first means discovered for preventing small-pox. In 1849, Dr. Monike, of Nagasaki, brought vaccine to Japan. Statistics show that before vaccination was practiced 357 died out of every 100,000, each year, while since vaccination has been introduced 42 out of 100,000 have died yearly. Hence the protecting power is evident. The time for vaccination is from the seventy-second day to one year after birth, but if small-pox is epidemic, it should be done after ten days. If there is a case of small-pox in the house at birth, immediate vaccination is required."

The vaccine farm was established in Tokio about five years ago, and is now kept constantly in operation.

There has been no small-pox in Yokohama or vicinity since 1874, and there is but little in the empire. Within the past year one case of the disease was brought here from Nagasaki, which did not spread.



## LIFE-SAVING AT SEA.

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BY C. J. CLEBORNE, M. D.,

MEDICAL INSPECTOR U. S. NAVY.

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Πλείν μὲν γὰρ γὰρ κακῶν, πλείν δὲ θάλασσα,  
Νοσοῖδ' ἀνθρώποι ἐν ἐφήμερῃ, ἥδ' ἐπὶ νυκτὶ  
Ἀντοματοὶ φοιτῶσι.—HESIOD. *Oper : et Dies.*

Resuscitare vitam dulce est,  
Atque etiam laudabile prævenire causam.

As the progress of civilization is marked by increased interest in the physical welfare of the community, the happiness and prosperity of the community will depend more and more upon the effective preservation of the individual.\*

To preserve health, to relieve pain, to save life, have been the highest aims of medical science in every age and nation, and marvellous has been the progress in the alleviation of human misery, and in the prolongation of life.†

Within a century, pain has been almost annihilated, and dis-

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\* "Sire," said Larrey to Napoleon at the siege of Jaffa, "it is my avocation to prolong life, not to destroy it"—a noble sentiment, worthy of the great military surgeon whom Napoleon declared to be "the only honest man he ever knew."

† The average of life is higher now than in the last century. From the thirteenth to the sixteenth centuries, the ages of 70 and 80 were rarely reached. During the seventeenth century the "expectation of life" among the better classes had increased 25 per cent.

ease and death stripped of half their terrors. The death-rate of cities has been reduced from 50 to 25 per 1,000, that of seamen from 74 to 22 per 1,000, and a saving of 62 per cent. on the average mortality of infants has been effected. The scourges of leprosy,\* small-pox,† typhus, and scurvy,‡ which once devastated the globe, have been almost exterminated, and last but not least, Jenner's discovery of vaccination has added over two years to the average life of man.

From this glorious record of medical science and hygiene, we turn to the immediate subject of this paper—the preservation of life at sea.

In the United States, the pioneer in this national and humane pursuit was the society organized in Massachusetts in 1786 for the relief of shipwrecked mariners. Its first "shelter-hut" was erected on Lovell's Island, near Boston, in 1789, and its first life-boat station was established at Cohasset in 1807. At present this society maintains 8 huts and 76 stations. In 1849, the "Life-Saving Benevolent Society of New York" was incorporated, and under an able management it has performed excellent work. In 1848, the Life-Saving Service of the United States was inaugurated, and it was completely reorganized in 1871. Over 140 stations have been erected on the coast, fitted with the necessary appliances for aiding vessels in distress, and nearly a thousand men are employed, who are specially prepared to render assistance to distressed mariners. Notwithstanding the smallness of the appropriations for this establishment, it has accomplished wonders under the superintendence

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\* As late as the sixteenth century there were 19,000,000 of lepers in Europe.

† A century ago, in England alone, 400,000 a year died of small-pox. It carried off one-tenth of mankind and disfigured as many more.

‡ Scurvy has been exterminated. In the British navy, at the beginning of this century, the deaths by scurvy alone exceeded those by battle, wreck, and all the other calamities of sea-life together.



of Mr. Sumner Kimball, and has already earned for itself a glorious record.

Life-saving has now become one of the leading questions of the day, growing in interest and importance with every new disaster, for our battle with the sea and storm is never-ending, and a fearful list of casualties is yearly scored to the credit of old ocean.\* This may result from a want of means, skill, or precaution on the part of those in authority, but is it not also due to that spirit of recklessness or fatalism so common in the sea-faring world? The fact is we need a system, a life-saving system, a drill which shall make every man familiar with the devices for saving life at sea, and the best means for such purpose should be provided for every sea-going vessel under the penalty of law.

"All men," says Hippocrates, "ought to know the science of medicine." He might have added with greater reason that all men ought to know how to swim. The art of becoming amphibious should be the first lesson taught, not for the purpose of being like the baptismal duck of Attar's fable—pure and clean—but for the nobler purpose of saving life. Strange to say, this accomplishment is neither taught nor required in the naval† or merchant marine, and many a valuable life has been lost that might have been saved by a little instruction in this most healthful recreation, which ought to form part of the education of every seaman, and be encouraged by emulation and suitable rewards. Were one-half of the time that is now devoted to boat-racing and other amusements given to the study and practice of the natatorial art, we would hear less of the calamities we

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\* In 1875 more than 1,500 vessels, with cargoes valued at \$11,000,000, suffered disaster on our coast, and nearly 900 lives were lost out of some 20,000 thus imperilled by shipwreck. During the ten years ending 1874 there were 22,000 wrecks and disasters on the British coast, involving a loss of 9,000 lives and \$90,000,000.

[† A knowledge of swimming is now required at the Naval Academy.—J. B. P.]

deplore, and the health and physique of our seamen would be vastly improved.

The Greeks of all ages were wretched seamen but famous swimmers. Like many of our modern tars they must have looked upon any aid to personal effort as an imputation upon their courage or web-footedness. At all events in their records the word *συσδία*, used in the sense of a buoy or life-preserver, is not to be found even among the *apparaur* of ships of the Heroic age, nor of those of a more advanced period during the Persian war. But then the Greeks were pessimists\* and fatalists; they cared nothing for human life; they looked upon death as the privation of all feeling—a sleep without a dream. Not to be born, they considered most reasonable, but having seen the light the next best thing was to die. In their wars by sea or land they made little or no provision for the preservation of life. Even in the invasion under Agamemnon, Podalirius and his brother, the celebrated physician Machaon (both sons of *Æsculapius*), were not charged (as one would suppose) with the health of the fleet, but had command of the squadron furnished by the *Æchali*ans.

In thirty sail the sparkling waves divide,  
Which Podalirius† and Machaon guide.

In tracing the history of life-saving devices, we shall find that progress has been slower and more unequal than the steady and successive improvement which has attended other branches of knowledge; indeed, the facts hitherto collected upon this subject are so scanty and unsatisfactory that we shall consider

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\* They were not alone in their pessimism; even the pious Bernard exclaims, "*Nasci miserum, vivere pœna, angustia mori*"—"Tis a misery to be born, a pain to live, a trouble to die.

† Podalirius was invited to stop a pestilence in the Grecian camp, and on his return from the Trojan war he married a daughter of Dametas, the King of Caria, whom he had cured of the "falling sickness." Machaon, King of Messenia, is mentioned as physician to the Greeks during the Trojan war. Quint. Smyr., v. 6., 409.

it here rather with a wish to excite inquiry than with any hope of imparting information.

There exists a fashion in life-saving machines, as in other things in life which are regulated by caprice or authority, but as years and fashions revolve, the old forms rise again into favor or are adapted to the spirit or necessities of the times; and so it turns out that most of our so-called inventions are mere revivals or adaptations of older forms.

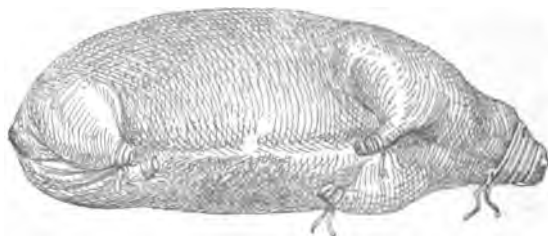
It is probable that the first life-preserver was an oar, a spar, or a floating piece of wreck. The ancients being strangers to the use of anchors,\* rarely ventured far from the shore. Their vessels were unwieldy, and their war-ships (*μακραι* or *χωπηρες*) were little better than huge boats, single-masted, and propelled by oars. As each man was provided with a long sweep (*χωπαι*, from Copas the inventor) which easily passed through the *οφθαλμοι* (oar-holes or ports), it will readily be seen that in case of accident or upset these oars formed the handiest and most efficient life-preservers; while from the single sail, the large hides which covered the ship's sides, and the immense gubernaculum at the stern, a life-raft could be improvised in case of shipwreck. From similar circumstances or from a profound contempt of danger, we find no mention of life-saving machines in the records of the northern Vikings or other hardy mariners of Europe. To the East, then, we must look for the origin of our modern life-preserver.

The Persians, Arabs, and Chilians used inflated skins for this purpose, so that *air* seems to have priority over cork and wood. These buoys are generally made of prepared goat or seal skins,

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\* The anchor (according to Pliny) was invented by the Tyrrhenians; by other writers it is ascribed to Midas, son of Gordias, whose anchor Pausanias declares was preserved until his time in a temple dedicated to Jupiter. They were first made of stone (Apollonius Argonaut. Arrianus in Periplo-ponti Euxini), and afterwards of wood and lead. Eupalamus or Anarcharsis added the double fluke.

and similar ones are still used by milk-women and Arabs for crossing the Tigris. The inflated skin is worn in front of the breast, the head and arms resting upon it, or it is formed into a ring buoy by fastening the legs together.



Persian skin buoy.

Cork was known to the Greeks and Romans and is mentioned by Pliny in his Natural History, but it does not appear to have been utilized by them for life-saving apparatus. The "catamaran" has been in use for centuries on the coast of Coromandel. It is composed of three pieces of wood lashed together (the middle piece being longer and broader than the others), and forms a raft that can live in any weather. The "bamboo habit" of the Chinese was in use as early as the eleventh dynasty of Tchin (sixth century). It is made of four good-sized bamboos placed horizontally two before and two behind; these are crossed by two others on each side so as to leave a space for the body. When these are properly fastened the "habit" may be put over the head and secured if necessary under the arm-pits.

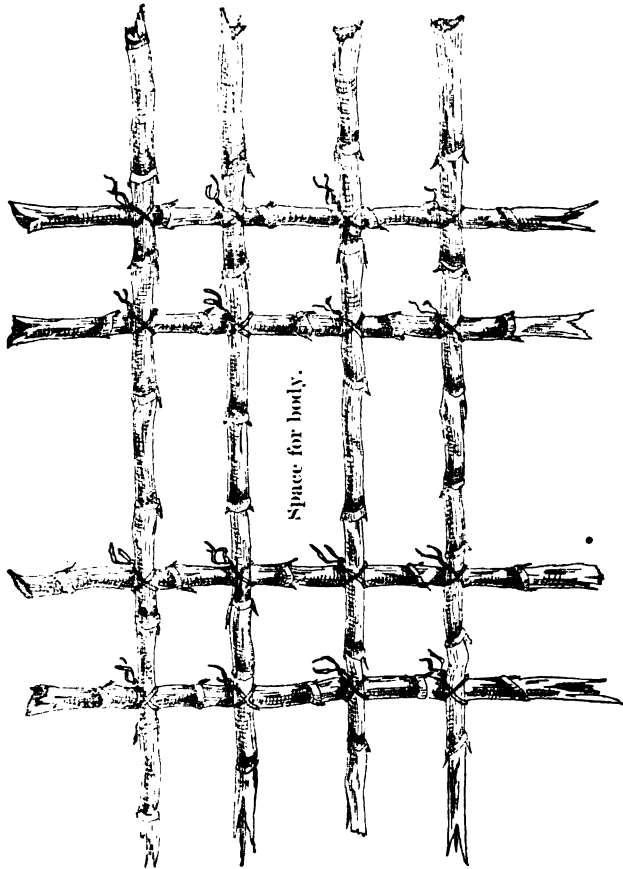
This forms a cheap, safe, and buoyant raft, which is easily stowed away and may be quickly put together.

No improvement upon these primitive machines\* appears to have been made in Europe until the eighteenth century, although

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\* A canteen, a gourd, a bladder, or even a hat tied in a handkerchief have been found useful in emergencies.

we have some recollection of seeing an old tract (printed in 1612) in which there is a quaint engraving of the saving of one Peter Ley by a Dutch West Indiaman. The apparatus in the wood-cut resembled an arm-chair.



Bamboo habit.

the first approach to our modern ring buoy was made by an English surgeon in 1802. Mr. Bosquet proposed a canvas

bag stuffed with cork shavings,\* equal in size to an ordinary bolster, "to be coiled or formed like a collar, and sufficiently wide for the head and shoulders to pass through, or to be put on and off by straps and buckles, so that it may occupy the space under the arm-pits and sustain a person in an erect position in the water." This bolster probably suggested the ring buoy or



Bosquet's girdle.

common life-preserver, and the coiled hammock of Ryder. Bosquet also constructed an oblong buoy of the same material, "with loops connected with the ends or sides, by which four men may be suspended without danger of losing their support, either by holding on or by placing their bodies between the loops and the machine." Four of these, he declared, would make an excellent raft, and twenty connected together would save over 80 people. These inventions were followed in 1803 by a life-saving "Horse," made in the form of a T, "for the purpose of conveying a man and line to the shore when a boat could not venture from the ship," and also a "round wicker boat"

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\* Cork was first used in England for this purpose in 1765, but Gelacey's cork jacket was introduced into France in 1757, and Lachapelle's "Scaphander" (an improvement thereon) is mentioned in the *Hist. of Paris Acad. Sciences* for 1765. About the same time Bachstrom proposed cork saddles for cavalry, to be used in crossing rivers and streams. The "Marine Spencer" was a vest made of bottle-corks strung together. *Vide Phil. Mag.*, vol. xvi. The "Seaman's Friend" consisted of two pieces of cork united by straps something like our modern cork life-preservers.

or life-car, for carrying persons from the ship to the shore. Then, as now, the problem was how to communicate with the wreck. In 1782, Dr. Fothergill, a philanthropic physician of London, suggested a method of saving ships and their crews by sending a line on shore attached simply to an empty cask. By this line it was intended to drag one or more hawsers from the ship to the shore, along which persons could be drawn to land either by their own exertions or by means of a boat or some buoyant vehicle. It was by this method that the rice-ship *Suffolk* and all of her crew were saved in 1802. The doctor's plan was improved upon by Hutchinson, who used a cask or ship's buoy, to which he attached a canvas umbrella sail to guide it to shore, and by Bosquet, who lightened the line by attaching to it, at the distance of every yard or two, cork or blow-bladders.\* Various other modes were suggested for carrying the line from the ship to the shore by means of a bow, a musket-ball, kite, rocket, or mortar-shell,† but these were considered futile or nugatory—impracticable in the hands of awkward seamen at a time when the ship was foundering or the sea breaking over her. Fothergill's keg and line seemed to be the most simple and practicable mode of communicating with the shore, though an ingenious Frenchman had successfully experimented with a huge kite (at the distance of 1,500 yards), had suggested a small balloon, had conveyed a rope over 200 yards by means of a perforated bomb, and had sent a line a distance of 500 fathoms attached to a rocket four inches in diameter.

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\* Cleghorne, in 1814, invented a buoyant line having a heart or core of cork. *Ide* Phil. Trans., vol. xxxii, p. 181.

† Lieutenant Bell, R. N., in 1791, first conceived the idea of connecting the ship with the shore by means of a line fired from a mortar. In the following year he sent a heavy sea-line 400 yards by means of a shell and mortar. (Trans. Soc. Arts., vol. xxv, p. 136.) In 1810 Captain Manby carried out Bell's idea by means of a mortar, line, and grapnel shot. Mons. Trenchouse suggested a rocket, and one of 8 ounces carried a line 180 yards, and one of 16 ounces, 212 yards.

The invention of the life-boat\* in 1789, by Mr. Henry Greathead, of South Shields, introduced a new era in life-saving. Districts were established on the English coast, stations and refuges erected, boats were built and manned by trained crews, life-cars or rafts were introduced, and lines were sent from the shore to the ship by means of rockets or shells. The latter is a questionable proceeding, as the chances are largely in favor of missing the ship, and the flight of the projectile excites apprehension on board. Fothergill's method is undoubtedly the best; the line should go *from the ship to the shore*.

On our own coast, three classes of stations are established—life-boat stations, life-saving stations, and houses of refuge. The system as organized by Mr. Kimball works admirably, and each complete station is fully equipped with all the modern appliances. Lines are still sent from the shore to the ship by means of life-line mortars or guns, and with improved projectiles in trained hands, considerable success has been attained. The life-line gun of Lieutenant Lyle, and the "Weymouth tube" have given great satisfaction, and both have beaten the Frenchman's range by 200 yards.† Some difficulty is experienced in paying out the line, but this may be obviated by making the tube or shell large enough to contain, say, 500 yards of fine line or piano wire, which would occupy less space, and could be paid out by the flight of the projectile.

When casks or floats are used, the drag of the line may be prevented by buoing it at intervals with cork, as recommended by Bosquet, or by water-proofing it with paraffine or other material. In Kimball's sledge-buoy this difficulty is obviated by unreeling the line from the float, and the machine is one of the

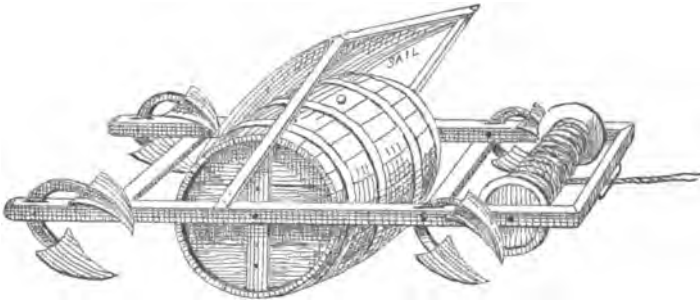
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\* Wilson's life-boat with air-gunwales was invented in 1807, Bremner's in 1810, and Bray's in 1818. Bremner's was made buoyant by casks like Manby's jolly-boat. Bray's had air-boxes under each seat.

† The French experiments at Lafere were subsequent to those made by Lieutenant Bell, R. N., in 1791.



best for overcoming the difficulties of the surf\* and undertow. A slight modification of it has occurred to me which will be best explained by the design.



Fluke buoy.

This machine may be made on board by the ship's carpenter at very little expense. Should it be overwhelmed in the breakers, as is apt to be the case, the movable double flukes will fall into position, and effectually prevent it when once ashore from being drawn back by the undertow. The canvas sail (first suggested by Hutchinson, and recently recommended by Lieutenant Mason) will accelerate the progress of the apparatus before the wind, and drive it ashore, even against the reaction of the surf or other obstacle.

The Jouett-Hoff apparatus consists of a large float carrying a reel with 2,000 yards of line, in front of which is a rectangular shield, acting like a sail in whatever position the float may take in the water. The large quantity of line which this machine carries and the certainty with which it is driven ashore are its strongest recommendations.

Nares' canvas kite is an improvement upon its archetype of

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\* Lieutenant Seymour suggests that each vessel be supplied with a life-boat crew of "Kanakas." These men performed all the surf work of the Narragansett during the survey of the Gulf of California, without losing an article or a man.

1802, but neither kites nor rubber balloons can be depended upon in heavy weather.

In shipwreck little reliance can be placed upon ships' boats, as they are nearly always swamped or upset. They are generally too few in number and are launched with difficulty in a heavy sea. Berthon's collapsing canvas boat, which stows in a very small space, and is almost as good as a life-boat, ought to be supplied to every vessel, in sufficient numbers to carry all the passengers and crew.

Life-rafts\* are after all the most useful means for saving life. Of these the "Ryder raft" is the best. Some years ago the rubber bolsa was introduced into the Navy, and has served many useful purposes, but the objection to this as well as the "barrel-bolsa" of Ammen, is that it is cumbrous and takes up too much room.

Most well-furnished ships are now provided with ring-buoys, life-belts, cork jackets, or metal life-buoys.† The latter are lighted with port-fire, but the light is not brilliant nor lasting, and is sometimes a total failure. To remedy this defect I would suggest the use of sodium or some substance that would burn in contact with water. Each of these contrivances is useful in case of accident or emergency, but we have a more reliable preserver in the hammock-mattress, which was first suggested by Admiral Ryder (of the British navy) for the purpose. The experiments of Bridge and Wilmhurst, of the Royal Navy, and those of Mr. R. B. Forbes, of Boston, fully confirmed the observation of Ryder, and have established the claims of the "hammock as a life-preserver." It has been found capable of sus-

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\*Cook's life-raft was a square canvas frame with a cask at each end. Rogers' life-raft was extemporized of capstan-bars or spars, with casks on each side. *Ibid* Trans. Soc. Imp. Naval Architecture, vol. xxxvii, p. 110.

†Cook's life-buoy, invented in 1818, was probably the original of our modern metal buoy. It consisted of two casks with a pillar, between which was a floating light or port-fire. It was kept suspended at the vessel's stern.

taining in water a weight of from 32 to 160 pounds, for a length of time varying (according to the contents and impermeability of the material) from 6 minutes to 36 hours. The admiral says: "The best way to use the hammock for one person is to secure the clews together, forming a ring, care being taken to have the lashing on the exterior in order to tauten it." A raft may be constructed from the hammocks used in this form by lashing their clews together, but for this purpose hammock-mattresses are preferred. Twenty cork hammocks lashed together within a framework of spars will support a dead weight of over 2,000 pounds, and it will readily be seen that a few such rafts constructed from the hammocks of a ship would be sufficient to save the entire crew, and even the provisions necessary for their support.

Opinion is much divided about the value of materials for stuffing mattresses. Some prefer cork, others hair or cotton. Cork mattresses have been introduced into the English navy, which will support over 60 pounds for a considerable length of time, but they are hard and uncomfortable as a bed. In a granulated state, or in shavings, cork loses much of its buoyancy, and if soaked in water for any length of time it becomes dense or soggy. Its principal objections, however, are hardness and loss of buoyancy when thoroughly soaked by sea-water. To obviate the latter defect, Lieutenant Mason, of the United States Navy, proposes to water-proof not only the hammock, but the mattress ticking, and if this could be thoroughly done it would leave nothing on the score of buoyancy to be desired. There still remains an insuperable obstacle to the general use of cork—its hardness.

A new mattress, stuffed with elastic felt, which is made by Mr. Ostermoor, of New York, has been adopted by the Navy Department for cabin and wardroom berths. It has been subjected to the severest tests, and approved by the best authority in the

merchant marine. It is unquestionably superior to hair, excelsior, cocoa fibre, wool, and other materials which lump or mat, and have more or less disagreeable smell, but whether it has buoyancy enough for the small hammock-mattress is a matter to be yet determined.

Air-beds of rubber have been proposed and have been successfully used both as mattresses and life-rafts. They have the advantage of lightness and great buoyancy, but they possess the objectionable features of coldness of surface, unpleasant smell, imperfect inflation, unequal displacement of air, and liability to damage from the heat of the body or from climatic change. These defects I propose to remedy by combining the air-chamber with a buoyant filling made of cat-tail down and cotton\*, or with the "elastic felt" of Ostermoor.

A rubber bunk-mattress, 5 feet four inches long by 2 feet 9 inches wide and  $3\frac{1}{2}$  inches deep, has (by actual experiment, when fully inflated with air) supported a weight of 600 pounds without sinking below the surface of the water, and it has carried a man weighing over 200 pounds so high out of water that even in a chopping sea the only wetting he received was from the spray.

Now, as the weight of the human body is a little less than that of an equal bulk of water,† it naturally floats in that liquid, and the extra buoyancy‡ required to keep the head well above water being estimated at 5 or 6 pounds, it will readily be seen that with the lightness and buoyancy of air—100 cubic inches weighing less than 31 grains, or 800 times less than water—a

\* The hairs of the cotton-grass or of the bombax are equally good for this purpose.

† See Robertson's experiments, *Phil. Trans.*, 1757.

‡ Dr. Wilkinson made numerous experiments and found that one pound of cork was sufficient to support in water an ordinary-sized man. *Phil. Trans.*, 1765.

very small air-chamber will be amply sufficient for life-saving purposes.\*

I therefore propose to take but one-half the cubic contents of a mattress for air-space, filling the rest with some elastic material, making and covering the whole bed with ticking in the ordinary manner. It may be made in two forms, Figs. 1 and 2, the former suitable for cabin and wardroom bunks, the latter for seamen's hammocks.

In Fig. 1 the air-chamber forms the lower half of the mattress and acts as a spring-bottom. In Fig. 2, it is divided into longitudinal or transverse sections, and is placed in the middle between a non-conducting layer of filling above and below, so as to completely isolate the chambers, and protect them from changes of temperature or the heat of the body. Thus made, it presents the appearance of the ordinary ship's mattress. It is equally durable, soft, and pliable, is easily rolled or folded in the hammock, and forms a clean, light, and elastic bed, which conforms to the pressure of the recumbent figure with all the elasticity of a spring-mattress.

As a life preserver or raft, it cannot be surpassed for safety, buoyancy, and durability. The air-chambers are so well protected from injury that they cannot be damaged or stove in by striking against the rocks or sides of a ship, and are not liable to puncture or loss of air, and cannot be cracked by changes of temperature, nor fretted by constant use.

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\* Air-jackets were used in 1724, *vide* Leupold's *Theatrum Pontificium*. In 1806 Daniels invented a water-proof leather air-jacket, and Ozanam a semi-circular air-float. The objection to all air contrivances was the liability to be punctured by rocks or spars, so the "Collinetta" was invented, and this consisted of a hollow copper vessel divided into cells. Water casks were advised as floats or life-preservers in *Trans. of Soc. Naval Arch.*, vol. ii, p. 51, A. D. 1796. In 1814, Boyce introduced his "safety-buoy," a hollow cylinder of canvas, painted and varnished, and in 1818 Grant suggested a life-preserver in the shape of a 36-gallon cask fitted with hand-ropes and ballasted with iron, which supported 10 men. *Trans. Soc. Naval Arch.*, vol. xxxi, p. 63.

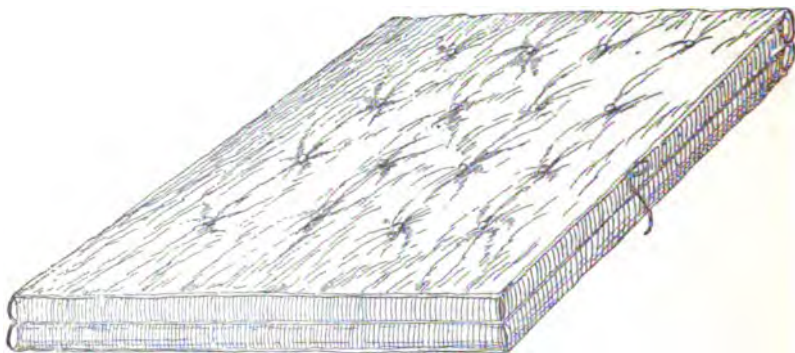


FIG. 1 represents a hospital or bunk mattress one-half of which is made of cat-tail and cotton, or elastic felt, the lower half to be an air-chamber of rubber cloth, protected by "balata."

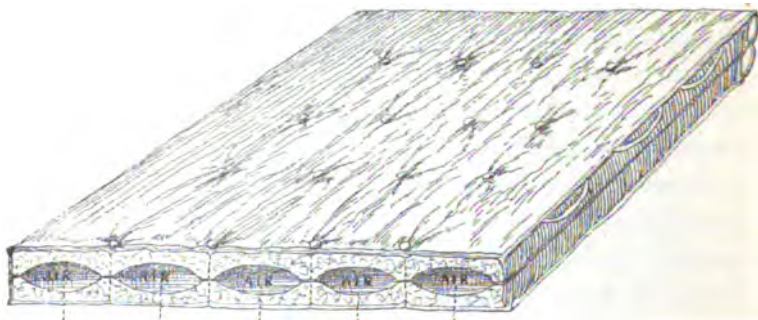


FIG. 2 represents a hammock mattress, 6 feet long, 30 inches wide, and 3 inches deep. In the centre is placed an air-chamber divided into sections; above and below the mattress is stuffed with hair, felt, or cotton. The dotted lines show the position of the "thrums."

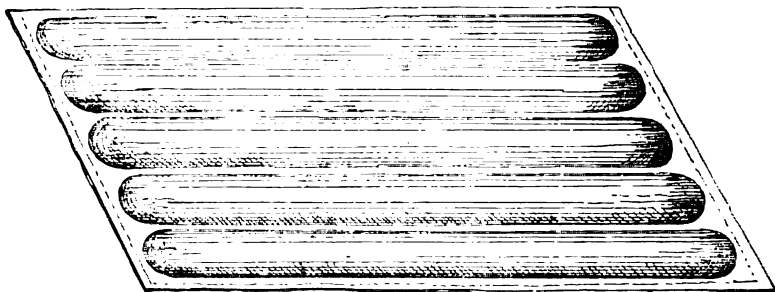
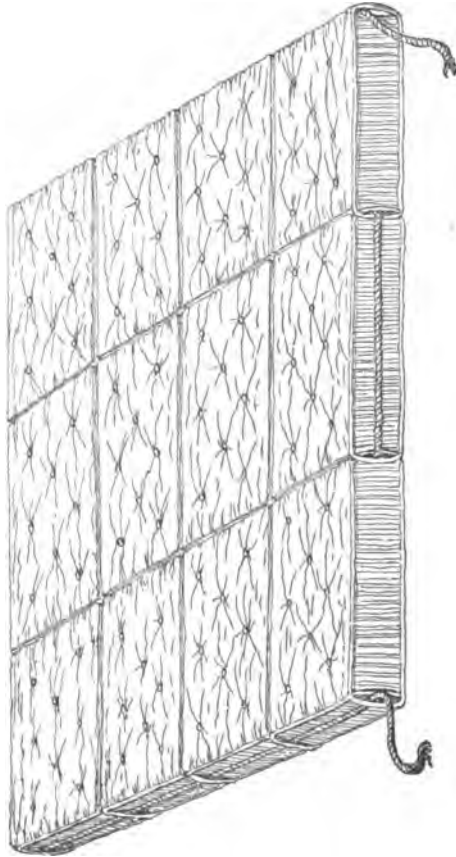


FIG. 3. An air-chamber divided into five sections and fully inflated. The sectional chambers may be placed longitudinally or transversely in a bed or hammock.



**FIG. 4.** Mattresses united to form a life-raft. They may be brought together and instantly united (with or without spars) by means of corner loops, as in Fig. 4, or by side loops as in Fig. 2 (also intended for the support of several men in the water), or by simple loops at side (or end) of mattress, and "stops" to form a becket-bend, as in Fig. 1.

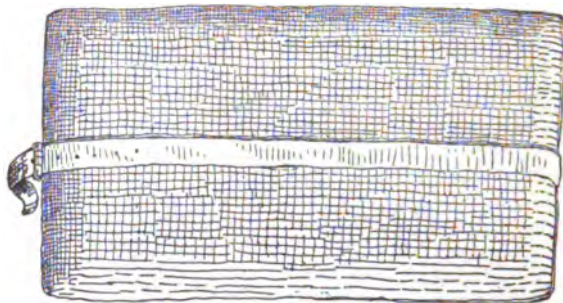


Fig. 5.



Fig. 6.

**Figs. 5 and 6.**—Pillows made upon the same principle as the mattresses. They may be attached to the breast under the arm-pits by means of a flat band and buckle as in Fig. 5, or by means of a light cord passing through loops attached to pillow. The cord being passed over the neck as in Fig. 7 is fastened behind by the ends of the cord.





Fig. 7.—Pillow life-preservers.

Being always inflated, the mattress is ready for instantaneous use as a bed, a life-preserver, or a raft. The latter may be quickly constructed (before or after launching) by running a lanyard through the loops of as many mattresses as may be needed for this purpose. Thus bound together, with or without spars, a continuous sectional raft may be formed, so safe, flexible, and buoyant, that it could not be capsized or pitch-poled in the roughest sea.

In this mattress the ticking need not be impermeable to water, as its buoyancy is not dependent upon its elastic filling. It may be water-proofed, if desired, without changing its appearance or flexibility, by soaking it for three or four hours in a solution of Irish or Iceland moss and acetate of alumina, or in a solution of the acetate of lead and alum, 8 ounces of each to

3 gallons of water. Its impermeability may be made absolute by afterwards coating the inside surface of the ticking with a thin solution of balata in bisulphide of carbon, which also covers the unpleasant odor of rubber cloth and increases its impermeability.

In conclusion, it is respectfully submitted that the best interests of the service would be subserved by the issue of life-saving mattresses by the government (as in the English navy), and care should be taken that every sea-going vessel be supplied with the approved appliances that might save her crew from the horrors of shipwreck.

# STATISTICS FROM THE FIFTH GENERAL CENSUS OF CHILI, 1875.

SUPPLIED BY SURGEON GEORGE R. BRUSH.

The following statistics taken from the "Fifth General Census of Chili, 1875," I deem of sufficient interest to forward to the Bureau.

## *Population.*

Census of—	Population.	Increase from census to cen- sus.	Annual increase.
1835.....	1,010,332		
1843.....	1,083,801	73,469	9,184
1854.....	1,430,120	355,319	32,802
1865.....	1,819,223	380,103	34,555
1875.....	2,075,971	256,748	25,675
Total for 40 years .....	7,428,447	1,065,639	26,640

## *Births, deaths, marriages.*

Years.	Births.	Deaths.	Excess of births.	Mar- riages.
1865.....	63,671	52,111	11,560	10,412
1866.....	69,796	48,399	21,397	10,288
1867.....	72,893	47,374	25,521	11,421
1868.....	77,162	48,814	33,348	12,684
1869.....	79,922	49,400	30,522	13,503
1870.....	81,134	47,473	33,661	13,506
1871.....	80,871	49,489	31,382	13,979
1872.....	86,878	57,725	29,153	15,792
1873.....	89,551	56,329	33,222	17,421
1874.....	90,371	55,897	34,474	16,670
Total 10 years .....	792,251	508,011	284,240	135,686
Average .....	79,225	50,801	28,424	13,569
1875.....	87,303	57,973	29,330	16,928

*Schools and colleges.*

Details.	Number in 1875.	Increase since 1865.
Schools .....	1,398	328
Pupils .....	90,264	39,517
Colleges .....	165	78
Pupils .....	17,235	9,839
Expenses in 1874 .....	1,212,714	706,085
Can read .....	477,321	168,012
Can read and write .....	421,149	157,268

The number over seven years of age, and able to receive instruction, that can read are given as follows :

Males, 270,908, or one for each 2.9 inhabitants.

Females, 206,413, or one for each 4.0 inhabitants.

That can read and write :

Males, 244,987, or one for each 3.3 inhabitants.

Females, 176,162, or one for each 4.7 inhabitants.

The following table shows the proportion existing between the sexes at different ages, and also their proportion to the general population :

Ages.		Percentage be- tween males and females.	Percentage of the total pop- ulation.
From 0 to 7 years .....	{ Males .....	51	22
	{ Females ..	49	21
Total .....		100	21
From 7 to 15 years .....	{ Males .....	52	20
	{ Females ..	48	19
Total .....		100	20
From 15 to 25 years .....	{ Males .....	48	20
	{ Females ..	52	22
Total .....		100	21
From 25 to 50 years .....	{ Males .....	50	31
	{ Females ..	50	31
Total .....		100	31
From 50 to 80 years .....	{ Males .....	50	6
	{ Females ..	50	6
Total .....		100	6
From 80 years and over .....	{ Males .....	44	1
	{ Females ..	56	1
Total .....		100	1

STATISTICS FROM FIFTH CENSUS OF CHILI. 1051

The number of individuals exceeding 80 years of age is given as 15,541, divided as follows:

Age.	Males.	Females.	Proportion.
From 80 to 89 years .....	4,453	5,735	490 in 100,000
From 90 to 99 years .....	1,806	2,259	196 in 100,000
From 100 and more .....	522	764	62 in 100,000

Three females are given as having reached the age of 142 years, the oldest male having attained 133.

*Disabled.*

Class.	Number.	Proportion of males.	Proportion of females.	Proportion to total population.
Asthmatics .....	81	1 in each 27,945	1 for each 23,645	1 for each 25,629
Blind .....	2,200	1 in each 862	1 for each 1,012	1 for each 944
Insane .....	2,150	1 in each 875	1 for each 1,068	1 for each 962
Paralyzed .....	888	1 in each 6,863	1 for each 3,129	1 for each 2,359
Deaf and dumb .....	1,149	1 in each 1,606	1 for each 2,063	1 for each 1,807
Cripples .....	1,069	1 in each 1,877	1 for each 2,012	1 for each 1,942
Variously diseased .....	3,834	1 in each 584	1 for each 590	1 for each 541
Total .....	11,379	1 in each 166	1 for each 203	1 for each 182

*Deaths.*

Years.	Under seven years of age.	Seven years of age and over.	Percentage of deaths.	
			Less than seven years.	More than seven years.
1865 .....	28,269	23,842	54.2	45.8
1866 .....	25,633	22,766	53.0	47.0
1867 .....	27,200	20,174	57.4	42.6
1868 .....	25,199	18,615	57.5	42.5
1869 .....	30,804	18,596	62.4	37.6
1870 .....	28,664	18,809	60.4	39.6
1871 .....	28,669	20,820	57.9	42.1
1872 .....	33,803	23,922	58.6	41.4
1873 .....	33,333	22,966	59.2	40.8
1874 .....	32,985	22,912	59.0	41.0
Average .....	29,456	21,345	58.0	42.0

*Hospitals from 1865 to 1874.*

Years.	Admitted.			Discharged.			Died.			Percentage of admitted.					
	Males.		Females.	Total.	Males.		Females.	Total.	Males.		Females.	Total.	Males.		Females.
	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.
1865	31,283	25,462	56,725	24,695	19,653	44,378	4,776	4,840	9,616	79.0	77.3	78.2	15.2	19.0	17.0
1866	34,400	18,742	53,222	28,483	14,438	42,921	4,241	3,351	7,592	82.6	77.0	80.6	12.3	17.9	14.3
1867	29,958	17,483	47,441	24,415	13,306	37,811	3,984	3,178	7,162	81.5	76.6	79.7	12.3	18.2	15.1
1868	26,335	16,804	43,139	20,610	12,783	33,393	4,121	3,958	7,079	40.3	76.1	77.4	12.7	17.6	16.4
1869	27,063	17,840	44,909	21,397	13,410	34,777	4,052	3,313	7,365	70.0	75.1	77.4	12.0	18.6	16.4
1870	27,455	17,870	45,325	21,531	13,540	35,071	4,072	3,193	7,265	78.4	75.8	77.4	14.9	17.9	16.0
1871	26,275	16,908	43,273	22,277	12,543	34,850	4,253	3,322	7,580	78.8	73.8	74.7	13.0	19.5	16.7
1872	28,870	15,307	44,177	22,453	11,344	34,767	4,804	3,748	8,552	69.5	74.1	78.6	13.5	18.1	15.9
1873	23,840	17,824	41,664	20,099	13,532	33,631	4,065	3,042	7,127	77.8	78.9	77.0	13.9	17.1	16.3
1874	26,114	16,816	44,980	20,183	14,265	34,448	4,235	3,234	7,469	77.3	73.8	76.7	16.2	17.2	16.6
Average.....	28,566	18,315	46,882	22,711	13,893	36,605	4,172	3,318	7,490	79.5	75.9	78.1	14.6	18.1	16.0

*Lazarettos from 1871 to 1874.*

Years.	Admitted.			Discharged.			Died.			Percentage of admitted.			
	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Discharged.		Died.	
										Males.	Females.	Total.	Total.
1871 .....	917	1,562	2,479	618	1,092	1,710	431	420	851	67.4	68.9	69.0	34.3
1872 .....	813	6,064	14,222	4,261	3,450	7,711	3,788	2,541	6,329	52.2	56.9	54.2	44.5
1873 .....	2,786	2,537	5,343	1,006	1,647	3,253	1,216	1,050	2,266	57.7	64.4	60.9	42.4
1874 .....	1,111	1,000	2,111	771	714	1,485	375	328	703	68.4	71.4	70.3	33.3
Total .....	12,972	11,183	24,155	7,256	6,903	14,159	5,810	4,339	10,149	55.9	61.7	58.6	42.0
										44.4	38.8		

The Indian population of Chili, including that of Patagonia, is estimated at 60,000. The foreign population numbers 26,635, 19,500 being males and 7,135 females. Of these, 7,183 are from the Argentine Confederation, 4,678 are Germans, 4,267 English, 3,314 French, 1,983 Italian, 1,223 Spanish, 931 from North America, &c.

The number of physicians in the republic is given at 259, being an average of one to 8,000 inhabitants; of this number 103 are foreigners, as follows: English, 22; German, 19; Italian, 17; French, 14; North American, 7; Spanish, 5, and 16 of other nationalities. Santiago, with a population of 150,367, has 82 physicians, and Valparaiso, with 97,737, has 33.

R. S. Tornero, in his "Chili Illustrated," Valparaiso, 1872, says that for twenty years after the founding of the Royal University of San Felipe, not one doctor in medicine was graduated, the profession not being considered a proper one for persons of good birth. In 1834, St. D. Joaquin Tocornal, then minister of the interior, placed one of his sons as a student of medicine in the hospital of San Juan de Dios, since which time the first families of the republic have not considered it improper to count among their members a doctor in medicine.

The same author states that the vaccine virus was imported in Chili by D. José Grazales, a Spanish physician, in October, 1805, but that its use did not become general before 1830. There is now established in Santiago a central office of vaccination for the procuring and the distribution of the virus.



## THE NAVIGATION OF THE AMAZON HYGIENICALLY CONSIDERED.

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BY SURGEON MELANCTHON L. RUTH.

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While engaged in determining the profile of the bed of the Mississippi, the U. S. S. *Enterprise*, a steamer of the third rate, carrying 8 guns, and drawing 16 feet of water, was ordered to proceed to South America, and on arriving there to make a track chart of the Amazon River as far as the mouth of the Madeira, and of the latter stream as far as San Antonio, the head of navigation and the starting-point of the line of railway which was constructing around the falls of the Mamore.

The ship was not especially adapted for such surveying duty. Her draft of water was great, and her internal arrangements were not suitable for a prolonged sojourn in an equatorial region.

Nevertheless she was the most available, at that moment, of the vessels of the service, and so, without further loss of time, she sailed for Para, Brazil.

The crew of the *Enterprise* was young and in perfect physical condition. All bad material was carefully eliminated before the vessel left Norfolk, to which port she had repaired for refitting, and new sailors filled the places of those men who seemed incapable of standing the severe strain of six months' sojourn in a hot and isolated country.

The same care was observed in regard to the officers of the ship, and none were permitted to remain except those whose physiques promised to bear the toil of the work.

The commander of the expedition, Thomas O. Selfridge, jr., commander U. S. N., had gained large experience in tropical work from his explorations in Darien, and consequently all the supplies were of a proper quality and packed in such manner as was best fitted for their preservation.

Every attention having been thus paid to the equipment and provisioning of the ship, she proceeded on her way to, and toward the latter part of May, 1878, arrived at the mouth of the Amazon with all well on board.

At Para the crew was again carefully inspected, and the regulations which were to govern both officers and men during the cruise up the river were issued. These included the following hygienic measures :

1. A complete bath for all the men three times a week, or more frequently if circumstances permitted.
2. Flannel to be worn next the skin by officers and men.
3. Working suits as issued in the Navy to be worn during working hours, and "jumpers" of light linen to be worn on special occasions.
4. Each man to be provided with a strong mosquito-bar so fitted to his hammock as to secure him protection at night from insect pests.
5. Each man to be provided with a wide-brimmed straw hat.
6. No person to sleep outside of the awnings, nor on shore.
7. No unnecessary visiting the shore after sundown.
8. Awnings to be spread during the day when practicable, and always at night.
9. Boats' crews and landmen to be always protected by awnings while at work.
10. An issue of *cachaza*, native rum, with a prescribed quantity of quinine to working parties or those exposed to unusual hardship.

11. Fresh meat and vegetables to be issued as often as practicable, and ripe fruit to be allowed *ad libitum*.

12. Condensed water to be used until it was determined, whether the water of the river was innocuous.

These rules were faithfully followed, and the result proved their wisdom.

The duty, although not absolutely arduous, was fatiguing and depressing. A progress of 25 miles a day was all that the exigencies of the survey would permit, as it was necessary to determine the latitude and longitude of points separate one from the other not more than that distance.

This slow progress was monotonous, yet it produced good results by enabling the crew to have much rest, and giving the commander an opportunity to time the starting and anchoring, so as to utilize the coolest hours of the day.

This daily routine was followed until the ship reached a point on the Madeira River, about 125 miles above San Antonio. Here the native pilots declared the channel to be intercepted by rocks, and, as the river was falling rapidly, it was deemed more advisable to send the steam-launch the remaining distance than to risk being entrapped by taking the ship over a route which would not be passable on her return. The steam-launch carried three officers and seven men, and was equipped as carefully as the circumstances of the case would admit. During her six weeks of absence the Enterprise remained at anchor in the Madeira River, opposite the island of Orna. The banks at this point are thickly wooded, but a clearing of perhaps an acre in extent afforded a foot-hold which was taken advantage of for purposes of recreation.

On the return of the launch the ship proceeded out of the Madeira, and after visiting Manaus, the capital of the province of Amazonas, pursued at her usual rate her way down the

Amazon to Para, and thence sailed for the United States, arriving at New York the latter part of September.

The cruise lasted five months. One hundred and seventy men were carried in round numbers 10,000 miles ; three months were spent in an average temperature of  $87^{\circ}$  on a river flowing through forest and jungle, yet not a man was lost, and there were but seventeen cases of sickness that could be traced to malarial or climatic influences.

The cruise was unique, and presented many opportunities for original investigation. Observations relating to navigation, topography, and astronomical position were made by the officers attached to the ship, and the results, carefully compiled, tabulated, and charted, are on file in the office of the Secretary of the Navy.

The flora and fauna of the Amazon Valley have been minutely described by such careful and enthusiastic explorers as Herndon, Gibbon, Bates, Wallace, Keller, Lidstone, Brown, Agassiz, and Orton. So exact have these gentlemen been that their works will not bear alteration or revisal. A rapid traverse of the river could add but little to the data obtained by these close observers.

Para, the principal city of the river, and the capital of the province of Para, lies in the delta, and is surrounded almost entirely by water. Its immediate vicinity is thickly wooded by a forest of tropical luxuriance, and the rise and fall of the tide, added to the yearly rise and fall of the river, expose its marshes and jungles to the alternations of heat and moisture so favorable to the propagation of vegetable poison. Its drainage is entrusted to the natural sloping of its streets. These are washed each day by the afternoon rains, and what animal refuse remains is consumed by the buzzards. These scavengers make the ridges of the houses their resting-places, and prowl the

streets with an assurance which long immunity has evolved into absolute hardihood.

The prominent diseases of the city are febriles of an innocent type, generally malarial; inflammations of the alimentary tract, scrofulosis, tuberculosis, and syphilis. Variola occasionally rages, and sporadic cases of yellow fever may always be found. This latter disease becomes epidemic at times, but is confined to Para, the upper river not suffering. Acute diseases yield readily to treatment, but chronic maladies are obdurate. The better classes pay great attention to cleanliness; baths are found in all their houses, and their attire is suited to the climate. The river furnishes an ever-present means of ablution to the lower classes, and their clothing is so simple that it needs no description.

Para is a city of considerable importance, and within its borders can be found many skilled medical men graduated from schools in France, England, and Brazil. It has several hospitals, some of which are free, while others require the patient to pay a certain fixed sum for his subsistence and treatment.

The best of the latter class has its home in a building which architecturally leaves nothing to be desired. Its wards are wide, solidly floored, and well windowed on each side, thus giving an almost perfect ventilation. The service is entrusted to a corps of residents under the direction of the principal surgeons and physicians of the city, and is conducted in a manner which is a credit not only to the skill of the medical staff but to the benevolence of the organization under whose auspices the institution is conducted and sustained. A small fee insures good care and the best medical talent. Foreigners and natives receive the same attention.

The general hospital of the city receives in its wards all of the indigent sick of the city without regard to color or nation-

ality. Its outward appearance is forbidding and its interior is not much better. All diseases except small-pox are admitted, and the wards are crowded with mild and severe cases, benignant and malignant, side by side. Yellow-fever patients are received without scruple, and the physicians in charge seemed to think lightly of the disease, as most of the sporadic cases yield quickly to treatment.

After leaving Para the traveller encounters villages and towns of more or less magnitude as he ascends the river. Some of these are mere collections of thatched huts, while others are more pretentious, substituting adobe houses for the huts. Here and there along the banks there are clearings of an acre or more in extent with a hut surrounded by groves of cocoa trees. These are the *fazendas* of rubber or cocoa gatherers, and the stranger is always welcome to the shelter of the roof of the hut and to his share of the frugal repast of the inmates.

None of the towns of the lower Amazon have hospitals, and in few of them can any medical men be found. The priests are both spiritual and physical advisers, and nature takes care of herself when no other assistance is available. Manaus, 1,090 miles from the mouth, is an exception to this rule. Here there is a small hospital, and there is a gentleman who devotes himself to the practice of medical science.

The unacclimated generally succumb for a time to the influence of malarial poisoning. The disease produced is similar to Chagres fever, and submits to the same treatment. He is liable, also, to lichen tropicus, and to the various skin diseases produced by long exposure to the heat of the tropics, and unless he exercises extreme care, he will find himself suffering from diarrhoea and dysentery.

He may, however, avoid these maladies by observing the ordinary rules of health, that is to say, by taking care not to

expose himself unprotected to the direct rays of the sun; by abstinence from crude fruit; by frugality of diet, and by moderation in the use of vinous, spirituous, and malt liquors. Experience has demonstrated that a small quantity of quinine taken in the early morning either in coffee or in rum acts as a prophylactic against malarial poisoning and also as a tonic. Frequent bathing, accompanied by light friction, serves to reduce to the minimum the liability to prickly heat; and by the use of pennyroyal tincture and gloves he may to an extent ward off the attacks of *piums* and mosquitoes, the bane of the turbid and black waters of Brazil.

The seasons divide themselves naturally into the wet and the dry, the former beginning about October and ending about May. During the wet season rain is apt to fall at any moment, but the sun's action is so powerful that the air is not laden with moisture, and the water is rapidly taken up by the parched earth. During the dry season days pass without rain, except the daily lightning and thunder squall, and even this is sometimes dispensed with on the upper Amazon. At Para, however, the regularity of the storm is astonishing. One may almost calculate with certainty the hour of the afternoon by the appearance of the clouds. The temperature of the air during the dry season averages about 87° Fah. through the day and 82° during the night. On the main river the intense heat is modified by the winds from the ocean, but on the affluents, such as the Madeira, the Tapajos, the Xingus, and the Rio Negro, hemmed in as they are by banks lined with tall trees, the effect of the cooling breeze is not felt, and the continued high temperature soon becomes almost unbearable.

Heavy dews fall at night, and the air seems to be laden with vegetable exhalations; hence it is unsafe for the stranger and even for the native to sleep out of cover. The climate in a short time produces a depression which cannot be shaken off. Apathy

takes the place of energy, and the most indomitable spirit soon falls into the sluggishness which characterizes the natives of the valley. The slightest exertion is followed by fatigue, and if the will urges the physique the result is a depression which lasts for days. This sapping effect of the climate is one of the strongest arguments against the successful prosecution of commerce in these regions, and already has had much to do in preventing the prosecution of engineering enterprises.

The forests of the Amazon are, to all intents and purposes, impassable. Through some districts the *estrados* (paths made by the rubber-gatherers) will conduct one by circuitous routes into the depths of the woods, but intercourse is generally had by means of the river, or by ways of water called "igaripés," which are simply narrow offshoots of the main stream. Travel in the forests is somewhat dangerous, as venomous snakes not infrequently attack the pedestrian. They, however, are not aggressive, and will not strike unless accidentally trodden upon or aroused to anger by being hemmed in. Some of them are so venomous that death speedily follows their bite, but others are less deadly, and timely action will save the patient. Ammonia, suction, and cauterization have been found the most beneficial. The boas are, of course, harmless, although their coil might be disagreeable. Ants of various varieties, some harmless, others stinging, and others venomous; scorpions, tarantulas, and spiders abound, and exercise annoying powers to an extent quite sufficient to destroy effectually any pleasure in pursuing nature amid her leafy fastnesses; but fortunately the stings of these vermin of the woods are only irritating, not fatal.

The *pium* and mosquito are the two great plagues of the river. The former is a small, almost microscopic, black fly which burrows under the skin, producing an itching pustule. It annoys during the day and no protection is sufficient to guard against it, while the mosquito, although active enough



during the day, swarms at night, and makes its way to its victim even through the meshes of a tightly woven tarlatan bar. The animals of the forest are, with a few exceptions, harmless. Tiger-cats sometimes attack the natives, but only when escape is impossible. They prefer to run rather than to fight.

Bathing in the river is unattended with danger if care is taken. Alligators sometimes attack the native children and women, and there are instances recorded where men have been bitten.

Electric eels abound in some ponds, and the stingaree occasionally inflicts a dangerous though not fatal wound. Earlier travellers tell of venomous fish, and descant upon strange animals which attack the natives, but it is to be feared that many such statements must be laid to rest with the Amazons themselves, and the gold-roofed houses which Orellana, Pizzaro's faithless lieutenant, described in his lying reports to his master.

The valley of the Amazon is sparsely settled by a population of mixed blood. In each town there may be found a few men who are of the pure Caucasian breed, but the majority of the inhabitants range in color from *café au lait* to intense black. Miscegenation is not only not unlawful but popular, and whites, Indians, Indians and negroes, negroes and whites, and the different crosses between them, marry and intermarry to such an extent that the blood is of such composition that no expert could decide to what race the people belong. A new color—that of French bronze—has been generated and will probably be the distinguishing mark of the native Amazonian until the Chinese admixture changes it. Virtue exists in name, but practically, except among the higher classes, it is not practised, and consequently diseases incident to immoral life thrive.

Syphilis was imported into the country about the time it was settled, and its results may be plainly traced to the present day. So soon as the old poison had run itself out a new stock was imported, and the supply has seemed more than equal to

the demand, for most of the men of the present generation have, or have had, the disease. Their children show the effects. They are strumous, weazened, and dried up. They seem to pine, and many die of marasmus and lung-softening. Others drag on a weary childhood, afflicted by excoriations, mucous patches and ulcers, finally succumbing to bony lesions, nodes of the skull and tibia, and softening of the brain and spinal cord. The consumption of quack medicines is enormous; preparations in which sarsaparilla is the vehicle having the preference. At Santarem a wine which is said to be a specific is made from the caju, a fruit abounding in that section, but as the usual number of secondary and tertiary cases presented themselves at this port, it is to be presumed that caju wine does not succeed in curing the disease.

The various skin affections, most of them varieties of pemphigus and ichthyosis, are probably the result of inherited syphilis. They yield temporarily to arsenic, potassium iodide, and mercury, but return as soon as the treatment is discontinued.

The cruise of the *Enterprise* demonstrated that by exercising the utmost care the river Amazon and its tributaries may be navigated without more danger than is incident to any other tropical river. The weak should not attempt it at present, but it is probable that when the railway is completed and opened, and the valley becomes more densely settled, many of the causes of disease will have been removed. Then the European of average constitution may pursue trade, with comparative immunity and with some comfort, into a country which now is not unjustly considered dangerous, if not deadly, to the unacclimated stranger.

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